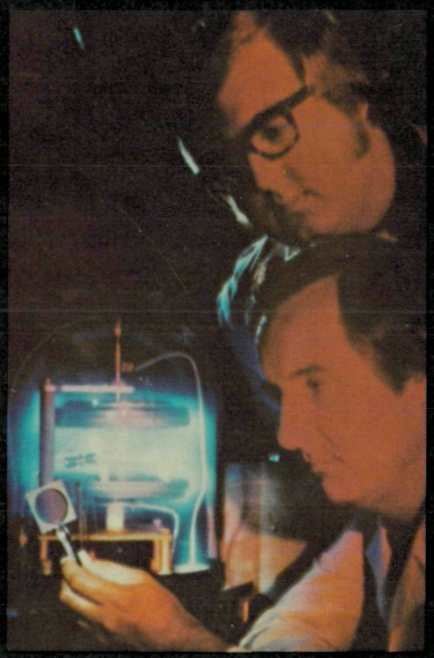
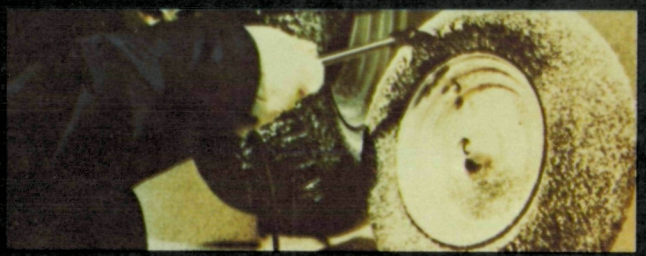
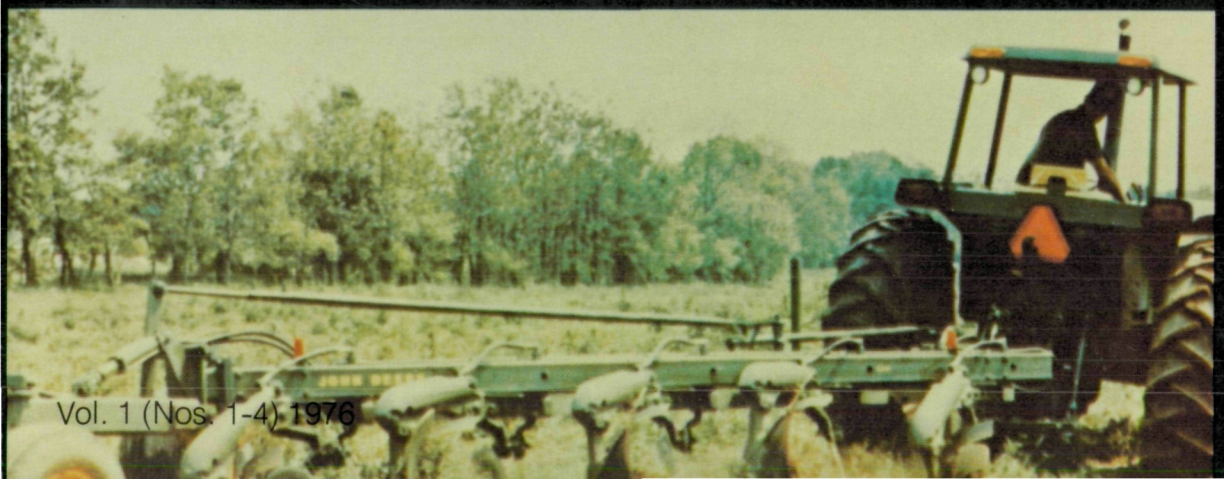
SP-5021 (17)

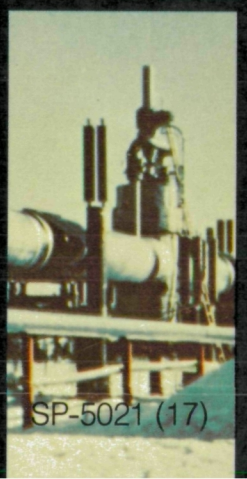
NASA Tech Briefs Index 1976

National Aeronautics and Space Administration









Vol. 1 (Nos. 1-4) 1976

SP-5021 (17)

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INTRODUCTION

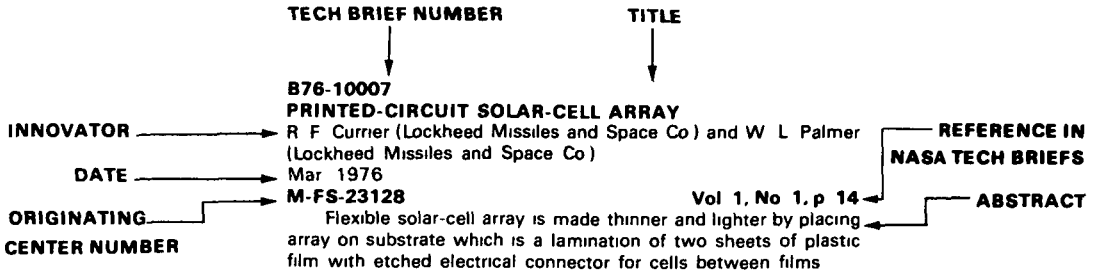
Tech Briefs are short announcements of new technology derived from the research and development activities of the National Aeronautics and Space Administration. These briefs emphasize information considered likely to be transferrable across industrial, regional, or disciplinary lines and are issued to encourage commercial application.

This *Index to NASA Tech Briefs* contains abstracts and four indexes -- subject, personal author, originating Center, and Tech Brief number -- for 1976 Tech Briefs.

Abstract Section

The abstract section is divided into nine categories: Electronic Components and Circuits; Electronic Systems, Physical Sciences; Materials; Life Sciences; Mechanics; Machinery; Fabrication Technology; and Mathematics and Information Sciences. Within each category, abstracts are arranged sequentially by Tech Brief number.

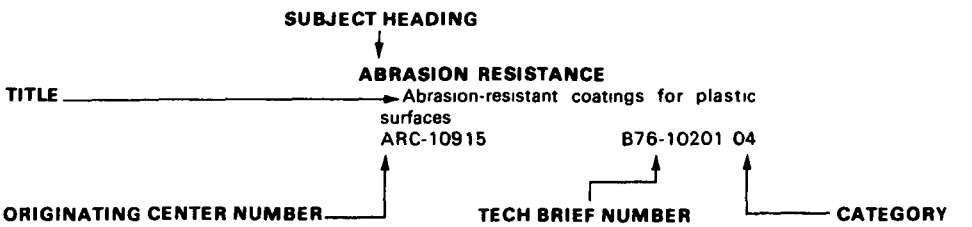
A typical abstract entry has these elements:



The originating Center number in each entry includes an alphabetical prefix that identifies the NASA Center where the Tech Brief originated. A list of prefixes and the corresponding Center names are given on page iii

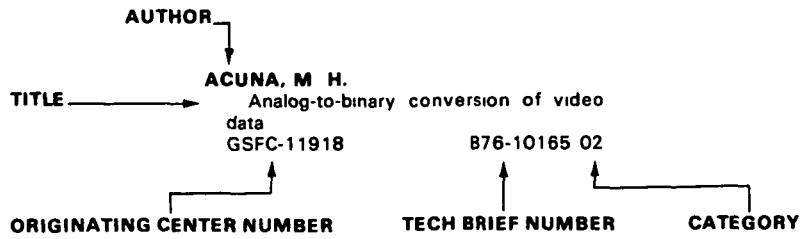
Indexes

Four indexes are provided The first is a subject, index, arranged alphabetically by subject heading. Each entry in the subject index includes a Tech Brief number and a category number to aid the user in locating pertinent entries in the abstract section



The January 1976 edition of the *NASA Thesaurus* (NASA SP-7050) is used as the authority for the indexing vocabulary that appears in the subject index. The *NASA Thesaurus* should be consulted in examining the current indexing vocabulary, including associated cross-reference structure. Only the subject terms that have been selected to describe the documents abstracted in this issue appear in the subject index Copies of the *NASA Thesaurus* may be obtained from the National Technical Information Service or the U S. Government Printing Office at $23.50 for the two-volume set.

The second index is a personal author index. Entries in this index are arranged alphabetically by author's name. Tech Brief and category numbers are supplied to help the user find the appropriate entries in the abstract section.



The third index relates each originating Center number to the corresponding Tech Brief number and category. Entries in this index are arranged in alphanumeric order by Center number.

The fourth index relates each Tech Brief number to its originating Center number. Entries are arranged in ascending Tech Brief number order.

Originating Center Prefixes

ARC	Ames Research Center
GSFC	Goddard Space Flight Center
HQ	NASA Headquarters
KSC	Kennedy Space Center
LANGLEY	Langley Research Center
LEWIS	Lewis Research Center
M-FS	Marshall Space Flight Center
MSC	Johnson Space Center (formerly Manned Spacecraft Center)
NPO	Jet Propulsion Laboratory/NASA Pasadena Office

Availability of NASA Tech Briefs

NASA Tech Briefs, a quarterly publication, is distributed free to U.S. citizens to encourage commercial application of U S. space technology.

Requests for individual Tech Briefs or for copies of the quarterly publication should be addressed to the Director, Technology Utilization Office, P.O. Box 8757, Baltimore/Washington International Airport, Maryland 21240.

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February 1977

Abstract Section

01 ELECTRONIC COMPONENTS AND CIRCUITS

B76-10001
PLUG-IN LIGHT SWITCHES
E J Stringer (Rockwell Intern Corp)
Mar 1976
M-FS-24183 **Vol 1, No 1, p 9**
New concept in electrical hardware for buildings is safer less expensive to manufacture, and easier to install than conventional wall receptacles

B76-10002
DIP EXTRACTOR SIMPLIFIES CIRCUIT REMOVAL
T Nies (Honeywell Inc)
Mar 1976
MSC-12712 **Vol 1, No 1, p 10**
Easily constructed tool can be used to pull dual in-line packaged integrated circuits off printed-wiring boards without damaging pins Extractor can be designed for most popular IC configurations and sizes

B76-10003
SUPERCONDUCTIVE NEURISTOR R-JUNCTION
S A Reible (Wisconsin Univ)
Mar 1976
HQN-10871 **Vol 1, No 1, p 11**
Device incorporating specially-configured pure metal transition region can be developed to simulate a nerve cell Combination of such cells may be formed to simulate an eye or brain and can be used in recognizing characters and other visual images

B76-10004
ECONOMICAL CUSTOM LSI ARRAYS
A Feller (RCA), A Smith (RCA), P Ramondetta (RCA), R Noto (RCA), and T Lombardi (RCA)
Mar 1976
M-FS-23262 **Vol 1, No 1, p 12**
Automatic design technique uses standard circuit cells for producing large-scale integrated arrays Computerized fabrication process provides individual cells of high density and efficiency, quick turnaround time, low cost, and ease of corrections for changes and errors

B76-10005
ULTRA-HIGH-VACUUM ELECTRICAL FEEDTHROUGH
J R Gavaler (Westinghouse Elec Corp) and M A Janocko (Westinghouse Elec Corp)
Mar 1976
HQN-10799 **Vol 1, No 1, p 13**
Device for cathodic sputtering utilizes cathode dark-space region adjacent to high negative-potential surfaces Feedthrough is made of metal and glass, is helium leaktight, and is bakeable, it can be incorporated into any vacuum apparatus

B76-10006
TRIPLE-LAYER BUBBLE-DOMAIN FILM
R D Henry (Rockwell Intern Corp)
Mar 1976
LANGLEY-11755 **Vol 1, No 1, p 14**
Stratified composite improves translational velocity while providing hard-bubble suppression and eliminating coercive field inhomogeneities

B76-10007
PRINTED-CIRCUIT SOLAR-CELL ARRAY
R F Currier (Lockheed Missiles and Space Co) and W L Palmer (Lockheed Missiles and Space Co)
Mar 1976
M-FS-23128 **Vol. 1, No 1, p 14**
Flexible solar-cell array is made thinner and lighter by placing array on substrate which is a lamination of two sheets of plastic film with etched electrical connector for cells between films

B76-10008
IMPROVED WET-SLUG CAPACITOR
C M Ward (Martin Marietta Corp)
Mar 1976 See also B74-10294, B75-10274
LANGLEY-11720 **Vol 1, No 1, p 15**
Capacitor uses all-tantalum seals and straight, ungelled, 30 percent sulphuric acid electrolyte to reduce leakage from order of milliamperes to low-microampere region Design offers better reliability in severe environments encountered in military and industrial electronics systems

B76-10009
A/D CONVERTER
M D Mason (Martin Marietta Corp)
Mar 1976
LANGLEY-11319 **Vol 1, No 1, p 16**
Two-part dual-slope system converts both low-level and high-level analog signals at 500 8-bit words/second with an accuracy of 3 percent

B76-10010
CONTROL LOGIC FOR SUCCESSIVE-APPROXIMATION A/D CONVERTERS
T O Anderson
Mar 1976
NPO-11937 **Vol 1, No 1, p 18**
Iterative building-block approach is used to minimize component count Modular design has same logic structure for all bits

B76-10011
M-ARY SHIFT REGISTER
M Perlman
Mar 1976
NPO-11868 **Vol 1, No 1, p 19**
Binary devices are used to construct an m-ary linear feedback shift register

B76-10012
IMPROVED MICROBRIDGE JOSEPHSON DEVICES
P N Peters and L B Holdeman (Natl Acad of Sci)
Mar 1976
M-FS-23274 **Vol 1, No 1, p 20**
Germanium overcoating of superconducting microbridges protects against electrical noise but does not limit sensitivity

B76-10013
INCREASED SAFETY IN MERCURY-CONTAINING DEVICES
G S Evans (Westinghouse Elec Corp)
Mar 1976
M-FS-23308 **Vol 1, No 1, p 20**
Amalgamating metal, such as gold tin, lead, cadmium, or indium, included inside mercury lamps reduces amount of escaping mercury vapor when lamps are fractured

B76-10014
ORGANIC ADHESIVES FOR HYBRID MICROCIRCUITS
K L Perkins (Rockwell Intern Corp) and J J Licari (Rockwell Intern Corp)
Mar 1976
M-FS-23370 **Vol 1, No 1, p 21**
Engineering design guidelines enumerate and briefly describe selected adhesive properties General review of polymeric types of adhesives is included and major types of commercially available adhesives specifically designed for microelectronic use are identified

B76-10015
POLYMER ADHESIVES FOR HYBRID CIRCUITS
S V Caruso and J O Honeycutt
Mar 1976
M-FS-23287 **Vol. 1, No 1, p 21**
Report discusses number of tests used in comparing polymer adhesives with metal bonding processes and includes charts and photographs to illustrate test results Findings suggest reduced quality control costs when epoxies are used in fabrication of microcircuits

B76-10137
TRANSISTOR-TO-SUBSTRATE BOND QUALITY
T A Telfer (GE)
Aug 1976
M-FS-21931 **Vol 1, No 2, p. 151**
Quantitative measurement of X-ray images of bonded *power-transistor chips is accomplished by using a light meter,* which determines percentage of voids in bond

B76-10138
DC-TO-DC CONVERSION WITH VOLTAGE MULTIPLIERS
W T Harrigill, Jr and I T Myers
Aug 1976 See also NASA-TM-X-71566 (N74-26737), NASA-TM-X-71735 (N74-23851)
LEWIS-12297 **Vol 1, No 2, p 152**
Compact device uses transformerless capacitor/diode voltage multiplier Advantages include efficiency at high power levels, increased reliability due to elimination of magnetics and associated electrical transients, no magnetic shielding requirement, and adaptability to modular or integrated circuit systems

B76-10139
MODULAR DESIGN OF HIGH FREQUENCY CIRCUITS
J T Zimmer (Raytheon Co)
Aug 1976
M-FS-23408 **Vol 1, No 2, p 153**
Method of circuit development separates electrical functions into noninterdependent parts, uses standard commercially available circuit elements, and establishes unified circuit-packaging *arrangement Packaging scheme is cost-effective, does not* compromise electrical circuit performance from video to UHF frequencies and leaves circuits accessible for modification and adjustment

B76-10140
FLUORESCENT-LAMP POWER SUPPLY
W E Milberger (Westinghouse Elec Corp)
Aug 1976
MSC-14900 **Vol 1, No 2, p 154**
High-efficiency cost-effective power source employs resonant circuit to change modes when passing from starting to running condition

B76-10141
COMPACT RECONDITIONER FOR NI/CD CELLS
R E Kapustka
Aug 1976
M-FS-23270 **Vol. 1, No 2, p 155**
Extension of life of multiple-cell nickel-cadmium battery packs is accomplished by reconditioning method requiring discharge of each battery cell Compact and lightweight dc-to-dc converter replaces relay-sensor system, protecting against voltage-reversal damage, and monitors overall cell condition

B76-10142
SOLID-STATE PARTICLE DETECTORS
J R Gigante (Maryland Univ) and R A Lundgren (Maryland Univ)
Aug 1976
GSFC-11785 **Vol 1, No 2, p 156**
Fabrication technique, involving change in ratio of resistance of alkali metal diffused layer to thickness of depletion layer, *enhances sensitivity in nuclear-particle detectors*

B76-10143
REMOVAL OF ENCAPSULATING MATERIALS
G L Jacobs (Sperry Rand Corp)
Aug 1976
GSFC-11696 **Vol 1, No 2, p 157**
Techniques involving softening or dissolving of potting materials leaves electronics unaffected Procedure may be used with almost any solvent or plastic within acceptable temperature and pressure ranges

B76-10144
HIGH-TEMPERATURE FLAT-CONDUCTOR CABLE
W S Rigling (Martin Marietta Corp)
Aug 1976
M-FS-23451 **Vol. 1, No. 2, p 157**
Temperature limit of 25-conductor signal cable and 3-conductor power cable fabricated using woven and roll laminated technique, increased from 200 C to 350 C when polyimide/fluorinated ethylene propylene or polytetrafluoroethylene insulation films and fluorinated ethylene propylene as adhesive medium is applied

B76-10145
IMPROVED SOLDERING IRON TIP
M A Vanasse (Rockwell Intern Corp)
Aug 1976
M-FS-19349 **Vol 1, No 2, p 158**
Nickel-plated device with machined recesses matching the multipin pattern of a particular circuit module, facilitates repairs to electronic systems and reduces chance of damage to adjacent components Nickel-plating reduces oxidation and scaling *Recesses retain sufficient amount of molten solder to uniformly* wet pins for simultaneous heating and extraction

B76-10146
CONNECTOR CONTACT-RING BUS
J Ligon (Rockwell Intern Corp)
Aug 1976
MSC-19480 **Vol 1, No 2, p 159**
Use of device eliminates crimp connectors and ferrules, resulting in compact termination assembly and efficient use of back-shell space Pair of insulator rings, one at each end of assembly, provides spacing between disc caps and contact rings

B76-10147
WAVEGUIDE-TO-COAX TRANSITION/LOW-PASS FILTER
R B Quinn
Aug 1976

NPO-13642 **Vol 1, No 2, p 160**
Low-insertion-loss combination device operates at 4 5 K and has reflection coefficient of better than -21 dB

B76-10148
POWER-CONTROL SWITCH
L L Kessler (Westinghouse Elec Corp)
Aug 1976
M-FS-23395 **Vol 1, No 2, p 161**
Constant-current source creates drive current independent of input-voltage variations, 50 percent reduction in power loss in base drive *circuitry, maintains* essentially constant charge rate, and improves rise-time consistency over input voltage range

B76-10149
CMOS-COMPATIBLE TRISTATE CABLE DRIVER
R L Pryor (RCA)
Aug 1976
M-FS-23410 **Vol 1, No. 2, p 162**
Device provides noise immunity, draws zero standby power, and improves performance where same bus connects several pieces of CMOS equipment

B76-10150
ELECTRICAL-CONDUIT SIZING GAGE
C E Caveness (Rockwell Intern Corp)
Aug 1976
MSC-19491 **Vol 1, No 2, p 163**
Device *indicates trade-size number of electrical conduit* without use of tables or references

B76-10151
TESTING FLAT-CONDUCTOR CABLE
R W Loggins and R H Herndon
Aug 1976
M-FS-23174 **Vol 1, No 2, p 164**
Report describes characteristics of type of FCC which consists of three AWG No 12 flat copper conductors laminated between two films of polyethylene terephthalate (Mylar) insulation with self-extinguishing polyester adhesive

B76-10152
SURFACE MOUNTED FLAT-CONDUCTOR CABLE
J D Hankins and J R Carden
Aug 1976
M-FS-223135 **Vol 1, No 2, p 164**
Report presents drawbacks and advantages of FCC for home wiring Two types of surface-wiring schemes are considered snap-on baseboard and extendable baseboard Both types lower installation cost and time

B76-10153
TEMPERATURE RISE OF INSTALLED FCC
J D Hankins
Aug 1976
M-FS-23127 **Vol 1, No 2, p 164**
Report discusses temperature profiles of installed FCC for wood and tile surfaces Three-conductor FCC was tested at twice nominal current-carrying capacity over bare floor and under carpet, with result indicating that temperature rise is not a linear function of current with FCC at this level

B76-10154
FLAT-CONDUCTOR CABLE BASEBOARD
J D Hankins
Aug 1976
M-FS-23141 **Vol 1, No 2, p 165**
Report presents procedures and results of test of FCC baseboard system developed for use in commercial and residential *applications Mechanical, electrical, chemical, environmental,* thermal, and analytical tests subjected system to conditions of greater severity than would be encountered in normal service, system withstood tests favorably

B76-10155
MANUFACTURE OF FLAT-CONDUCTOR CABLE
W Angele
Aug 1976
M-FS-23121 **Vol 1, No 2, p 165**
Report discusses cable design and fabrication of both unshielded and shielded FCC Discussion includes numerous cable configurations and fabrication processes, such as laminating, etching, extruding, and weaving Bibliography lists additional references

B76-10156
ELECTRONIC CIRCUITS **Vol 1, No 2, p 165**
Innovator not given Aug 1976 See also NASA-SP-5972(07)
HQN-10894
Twenty-nine circuits and circuit techniques developed for communications and instrumentation technology are described Topics include pulse-code modulation, phase-locked loops, data coding, data recording, detection circuits logic circuits, oscillators, and amplifiers

B76-10157
ELECTRICAL-CABLE DESIGN GUIDE
G A Phelps (Rockwell Intern Corp)
Aug 1976
M-FS-24280 **Vol 1, No 2, p 166**
Formulas and tables are provided to aid designers in *determining electrical cable jacket sizes, number of wires per* lay pattern, filler material requirements, jacket wall thickness, and overall cable diameters

B76-10158
INSTALLATION OF SURFACE-MOUNTED FLAT-CONDUCTOR CABLE
J R Carden
Aug 1976
M-FS-23266 **Vol 1, No 2, p 166**
Guide describes step-by-step process for installation of interior surface-mounted FCC used in commerical and residential buildings Photographs illustrate how cable-riser and baseboard covers are installed as well as receptacle assembly and receptacle-cover replacement

B76-10159
GUIDELINES FOR MULTIPLE LSI PACKAGING
C J Peckinpaugh (Electron Commun , Inc)
Aug 1976
M-FS-23367 **Vol 1, No 2, p 166**
Handbook provides specific guidelines related to ceramic multilayer circuit fabrication in terms of packaging density and interconnection methods, guiding the designer from initial stages of ceramic multilayer interconnection and artwork generation through test pattern utilization assembly operations, and final inspection and test procedures

B76-10290
A NONSATURATING DC-TO-DC PARALLEL POWER CONVERTER
T Lavigna, G Gant (Xerox Corp), and L Jan (Xerox Corp)
Jan 1977
GSFC-12047 **Vol 1, No 3, p 311**
Device is conventional circuit modified with pair of diode rectifiers coupled to switching transistors via feedback winding Transient-causing collector-current overlap between transistors is eliminated Technique may be used with nonsaturating parallel-transistor converters operating from voltage source which remains fixed or varies over small range

B76-10291
A LINEAR PHASE DEMODULATOR
R R Rippy
Jan 1977
GSFC-12018 **Vol 1, No 3, p 312**
Circuit operates on feedback principle to reduce modulation index of received signal, and thus reinserts carrier component in suppressed carrier signal Device can demodulate phase-shift-keyed signals which do not have carrier component, and it has linear region of plus or minus 150 deg

B76-10292
FLUORESCENT DIMMING BALLAST
P Lutus (ILC Technol)
Jan 1977
MSC-14937 **Vol 1, No 3, p 313**
High-frequency inverter and saturable inductor control fluorescent lighting system operating from 20 kHz power supply Filament power is unaffected, and only ballast is controlled

B76-10293
TOROIDAL CONVERTER CORE
W T McLyman
Jan 1977
NPO-13413 **Vol 1, No 3, p 314**
Improved approach consists of cut and uncut cores nested in concentric configuration Cores are made by winding steel ribbon on mandrel and impregnating with epoxy to bond layers together Gap is made by cutting across wound and bonded core Rough ends are ground or lapped

B76-10294
COMPOSITE STACKED MOLY-PERMALLOY CORES
W T McLyman
Jan 1977
NPO-13578 **Vol 1, No 3, p 316**
Composite core comprised of two sections, each having different permeability results in size and weight reduction One section provides sufficient induction under light loading conditions, while other section offers minimum inductance under heavy loading

B76-10295
BAND-ELIMINATION FILTER
G B Shelton (Sperry Support Services)
Jan 1977
M-FS-23303 **Vol 1, No 3, p 317**
Helical resonator is employed to produce stable, highly selective filter Other features of filter include controlled bandwidth by cascading identical stages and stagger tuning adjustable notch depth good isolation between stages, gain set by proper choice of resistors, and elimination of spurious responses

B76-10296
COUNTING DIGITAL FILTER
S Zohar
Jan 1977 See also B76-10297, B76-10298, B76-10299
NPO-11821 **Vol 1, No 3, p 318**
Overall design of filter combines radix converter with ADC in single functional unit that directly converts analog input to its negative binary representation Four basic elements of filter are fixed register, shift register, counter, and accumulator

B76-10297
CIRCULATING-LINES DIGITAL FILTER
S Zohar
Jan 1977 See also B76-10296, B76-10298 B76-10299
NPO-11831 **Vol 1, No 3, p 319**
Filter has array of line segments of various lengths which may be switched into circulating line by machine operator Design is useful in cases where filter speed is not critical, by sacrificing speed, filter can be made at lower cost

B76-10298
PARTITIONED COUNTING DIGITAL FILTER
S Zohar
Jan 1977 See also B76-10296 B76-10297, B76-10299
NPO-11832 **Vol 1, No 3, p 320**
High-speed variation of counting digital filter implements count in a way which allows shortest permissible spacing between samples of input signal to be small fraction of time it takes to compute output sample

B76-10299
HYBRID DIGITAL-ANALOG IMPLEMENTATION OF DIGITAL FILTERS
S Zohar
Jan 1977 See also B76-10296, B76-10297 B76-10298
NPO-11833 **Vol 1, No 3, p 321**
Hybrid device, which is modification of counting digital filter, obtains high speed through lower precision mainly effected by substituting analog device for digital counter

B76-10300
ELECTRICAL-SPLICING CONNECTOR
E J Stringer (Rockwell Intern Corp)
Jan 1977
M-FS-24254 **Vol 1, No 3, p 322**
Connection can be made without removing insulation and connector case insulates splice Device can be made in various sizes and saves time especially when working on prototype boards with several interconnecting test leads

B76-10301
FOLDBACK CURRENT-LIMITING FOR HYBRID REGULATOR
C H Crider (IBM)
Jan 1977
M-FS-22995 **Vol 1, No 3, p 323**
Technique utilizes operational high gain amplifier, which greatly reduces temperature sensitivity of short circuit current to amplify and subtract voltage across current sensing resistor from regulated output voltage Small current sensing resistor may be used to eliminate power loss problem found in conventional circuits

B76-10302
FEEDBACK ARRANGEMENT FOR REGENERATIVE SWITCHES
W T McLyman
Jan 1977
NPO-13060 **Vol 1, No 3, p 324**
Load current feedback technique samples load current instead of collector current, which makes it possible to operate switching transistors at their maximum capacities for pulse loads

B76-10303
LOW-COST PRESSURE-DATA ENCODER
R B Kolbly and S R Hedges
Jan 1977
NPO-13692 **Vol 1, No. 3, p 325**
Electronic encoding altimeter has pulsed output with pulse width proportional to altitude and converts pressure-proportional input voltage to digital signal that may then be routed to monitoring or display equipment

B76-10304
LOW-VOLTAGE MOTOR HEATER
K R Bezant (TWA)
Jan 1977
KSC-10651 **Vol 1, No 3, p 326**
Heater has stepdown transformer for low voltage range, variable transformer for holding within 0-to-28 volt range and voltameters and ammeters to monitor load and wattage Regulated thermostat controls contactor, permitting heater to cycle

B76-10305
MULTIPLE-LAYER PRINTED-WIRING TRACE CONNECTOR
D E Pizzeck
Jan 1977
LANGLEY-11709 **Vol. 1, No 3, p. 327**
Nickel-plated spring-steel foil connector is hollow pin with lengthwise slit, that is inserted into improperly plated-through holes Edges of connector make positive contact with copper pads within hole

B76-10306
BATTERY SINGLE-CELL PROTECTION SYSTEM
R D Thomas and W J Nagle
Jan 1977
LEWIS-12039 **Vol 1, No 3, p 328**
Protective circuit consists of solid state comparator switch and high current switching device combined into single module,

which can be mounted directly on each cell as part of cell or battery case construction System prohibits driving cells beyond set voltage limits and allows deeper discharge without cell reversal

B76-10307
WIDEBAND DISTRIBUTION AMPLIFIER
C F Foster
Jan 1977
NPO-13256 **Vol 1, No 3, p 330**

Device provides 12 outputs isolated from each other by 70 dB at 100 MHz, frequency range of 0 1 to 100 MHz, less than 2 deg phase shift over temperature change of 0 to 50 C, and computer level output to monitor module signal quality

B76-10308
OVERLOAD-PROTECTOR/FAULT-INDICATOR CIRCUIT
J R Paluka and S F Moore (Resdel Eng Corp)
Jan 1977
NPO-13592 **Vol 1, No 3, p 331**

Circuit incorporates three-terminal current limiter (78M24) to increase overall reliability and to eliminate transistor burnouts resulting from shorted interconnection lines and other overloads Fast-acting light emitting diodes across the limiters show status of transistor output circuits

B76-10309
LOW-FREQUENCY SINE WAVE HARD-LIMITING TECHNIQUE
T O Anderson
Jan 1977
NPO-13230 **Vol 1, No 3, p 332**

Circuit includes serial-in/parallel-out shift register and weighting network that are used to eliminate effects of noise and other nonrepetitive circuit transients Register and weighting network average decisions from section of signal where decisions are more dependable or where differences between two consecutive samples are larger

B76-10310
SIGNAL LEVEL DETECTOR
T O Anderson
Jan 1977
NPO-13272 **Vol 1, No 3, p 333**

Frequency-independent circuits measure amplitude of sine waves via Schmitt-trigger circuits, pair of inverters, and two flip-flop stages Accuracy of unit is limited by Schmitt trigger threshold levels, which depend on temperature and on component variations from unit to unit

B76-10311
PLUG-IN CIRCUIT MONITOR
E J Stringer (Rockwell Intern Corp)
Jan 1977 See also B76-10312
MSC-19455 **Vol 1, No 3, p 334**

Intelligent electronic circuit is used to monitor other circuits within module and to warn of imminent failure of module under surveillance Monitor is housed in rectangular connector and plugs into mating jack originally designed to terminate flat conductor cables Device can be made from existing premolded rectangular connectors

B76-10312
MICROPROGRAMABLE MODULE
E J Stringer (Rockwell Intern Corp)
Jan 1977 See also B76-10311
MSC-19456 **Vol 1, No 3, p 335**

Device is small lightweight selective circuit/function panel that utilizes microelectronic circuits in flat packs to eliminate hard wiring and heavy-harness routing to various subsystems

B76-10313
MAJORITY-VOTED LOGIC FAIL-SENSE CIRCUIT
W T McLyman
Jan 1977
NPO-13107 **Vol 1, No 3, p 336**

Fail-sense circuit has majority-voted logic component which receives three error voltage signals that are sensed at single point by three error amplifiers If transistor shorts, only one signal is required to operate if transistor opens, two signals are required

B76-10314
HYBRID THIN-FILM AMPLIFIER
G Cleveland (Lockheed Missiles and Space Co)
Jan 1977
MSC-13975 **Vol 1, No 3, p 337**

Miniature amplifier for bioelectronic instrumentation consumes only about 100 mW and has frequency response flat to within 0 5 dB from 0 14 to 450 Hz Device consists of five thin film substrates which contain eight operational amplifiers and seven field-effect transistor dice

B76-10315
SOLID-STATE RF SWITCH
M F *Hanna and* H K *Detweiler*
Jan 1977
NPO-13081 **Vol 1, No 3, p 338**

Consisting of NAND gates, switch can be expanded to multipole input and can switch at frequencies up to 30MHz Device uses digital integrated circuits to provide isolation between inputs and between input and output parts

B76-10316
RAM DIGITAL FILTER
S Zohar
Jan 1977
NPO-13659 **Vol 1, No 3, p 339**

Modification of conventional digital counting filter is designed to store all possible combinations of filter coefficients in random access memory Filter includes analog-to-digital coverter, X shift register memory accumulator, and digital-to-analog converter

B76-10317
SIMPLIFIED CUT-CORE INDUCTOR
W T McLyman
Jan 1977
NPO-13600 **Vol 1, No 3, p 339**

Technical memorandum describes design of linear reactor fabricated from grain-oriented steel It includes design charts and nomographs and illustrates design of grain-oriented inductor via seven-step example Typical values of core inductance, operating frequency, and coil current (dc and ac) are given

B76-10318
MASK ANALYSIS PROGRAM
M Martin and C L Mitchell (M&S Computing Inc)
Jan 1977
M-FS-23431 **Vol 1, No 3, p 340**

Program uses minimal core and time resources and performs following analysis functions artwork verification, device identification, nodal analysis, capacitance calculation, and logic equation generation For data base simplicity, program processing operates on mask data which has been coverted from its original form to orthogonal rectangles

B76-10439
IMPROVED RESOLUTION FOR SENSOR ARRAYS
W C Goss
Mar 1977
NPO-13745 **Vol 1, No 4, p 487**

Interpolar algorithm simple enough to hard-wire by hand improves resolution by factor of 5 to 20

B76-10440
CHARGE-SENSITIVE AMPLIFIER WITH NOTCHED FREQUENCY RESPONSE
D F Stout (Martin Marietta Corp) and M D Mason (Martin Marietta Corp)
Mar 1977
LANGLEY-11317 **Vol 1, No 4, p 488**

Charge sensitive amplifier outputs bipolar pulse with maximum peak of 5 volts This is applied to negative inputs of two high-speed

comparators These change output states only if pulse applied to negative inputs exceeds dc bias on their positive inputs Output is transferred to digital event counter

B76-10441
A PASSIVE CHEVRON REPLICATOR
T R Oeffinger (Rockwell Intern Corp) and L R Tocci (Rockwell Intern Corp)
Mar 1977
LANGLEY-11906 **Vol 1, No 4, p 490**
Instrument design provides replicate function between device storage area and guardrail detector in order that nondestructive read-out of memory can be achieved Use of guardrail detectors in magnetic domain (bubble) circuits is proposed method of increasing detector signal output by increasing detector size without dedicating an excessive amount of device chip area to detector portion

B76-10442
NEW PASSIVE REPLICATOR FOR BUBBLE DOMAIN DEVICES
P K George (Rockwell Intern Corp) and T Kobayashi (Rockwell Intern Corp)
Mar 1977
LANGLEY-11997 **Vol 1, No 4, p 491**
Bar-spacing tolerances are relaxed in replicator suitable for low-drive field

B76-10443
CONTINUOUS-DATA FIFO BUBBLE SHIFT REGISTER
T T Chen (Rockwell Intern Corp)
Mar 1977
LANGLEY-11862 **Vol 1, No 4, p 492**
Simple loop first-in-first-out (FIFO) bubble memory shift register has continuous storage capability Bubble shift register simplifies chip-control electronics by enabling all control functions to be alined at same bit FIFO shift register is constructed from passive replicator and annihilator combinations

B76-10444
MULTIPLE-BUBBLE DETECTOR
P K George (Rockwell Intern Corp)
Mar 1977
LANGLEY-12043 **Vol 1, No 4, p 493**
Device is segmented multiple-input detector Bubbles are fed into each section simultaneously Detector output is improved by using passive replicators

B76-10445
INDUCTORLESS VOLTAGE MULTIPLIER/CONVERTER
L H Bannister (MIT) and R H Baker (MIT)
Mar 1977
NPO-13757 **Vol 1, No 4, p 493**
Voltage multiplier configuration consists of identical stages connected in cascade to obtain desired output voltage

B76-10446
DIGITAL VARYING-FREQUENCY GENERATOR
M J Allen (Martin Marietta Corp)
Mar 1977
MSC-16331 **Vol 1, No 4, p 495**
Generator employs up/down counters, digital-to-analog converters and integrator to determine frequency and time duration of output Circuit can be used where varying signal must be controlled accurately over long period of time

B76-10447
OPEN-LOOP DIGITAL FREQUENCY MULTIPLIER
R C Moore (Johns Hopkins Univ)
Mar 1977
MSC-12709 **Vol 1, No 4, p 496**
Monostable multivibrator is implemented by using digital integrated circuits where multiplier constant is too large for conventional phase-locked-loop integrated circuit A 400 Hz clock is generated by divide-by-N counter from 1 Hz timing reference

B76-10448
DIPLEXER SWITCH **Vol 1, No 4, p 497**
C H Grauling, Jr (Westinghouse Elec Corp) and T W Parker (Westinghouse Elec Corp)
Mar 1977
LANGLEY-11546
Switch achieves high isolation and continuous input/output matching by using resonant coupling structure of diplexer Additionally, dc bias network used to control switch is decoupled from RF input and output lines Voltage transients in external circuits are thus minimized

B76-10449
DEFLECTION AMPLIFIER FOR IMAGE DISSECTORS
P M Salomon
Mar 1977
NPO-13079 **Vol 1, No 4, p 498**
Balanced symmetrical y-axis amplifier uses zener-diode level shifting to interface operational amplifiers to high voltage bipolar output stages Nominal voltage transfer characteristic is 40 differential output volts per input volt, bandwidth between -3 dB points is approximately 8 kHz loop gain is nominally 89 dB with closed loop gain of 26 dB

B76-10450
UNIVERSAL SOLAR-CELL TERMINAL
S Bashin (TRW, Inc) and F G Kelley (TRW Inc)
Mar 1977
M-FS-23505 **Vol 1, No 4, p 499**
Terminal, which replaces stakes or lugs in conventional design with loop receptacles for wires from cell and harness, uses dissimilar bonding properties (metal-to-glass and/or ceramics) of iron-nickel-cobalt alloy in conjunction with standard termination

B76-10451
SOLID-STATE TURN-COORDINATOR DISPLAY
R K Crouch, W L Kelly, and B D Meredith
Mar 1977 See also NASA-TM-X-7282 (N76-32186)
LANGLEY-12090 **Vol 1, No 4, p 500**
Light emitting diodes are employed in displays for aircraft instrument applications Device offers three levels of brightness to compensate for varying degrees of ambient light present in cockpit

B76-10452
DOPPLER EXTRACTION WITH A DIGITAL VCO
E R Starner (RCA) and E J Nossen (RCA)
Mar 1977
MSC-14814 **Vol 1, No 4, p 502**
Digitally controlled oscillator in phased-locked loop may be useful for data communications systems, or may be modified to serve as information extraction component of microwave or optical system for collision avoidance or automatic braking Instrument is frequency-synthesizing device with output specified precisely by digital number programmed into frequency register

B76-10453
SIGNAL ENHANCEMENT FILTERS
H B Killen (TRW, Inc) and W B Warren (TRW Inc)
Mar 1977 See also NASA-CR-147537 (N76-21369)
MSC-14907 **Vol 1, No 4, p 503**
Designed to smooth digital output of radar tracking systems, two filters prevent noise-induced inaccuracies and result in input/output noise-variance reduction on order of 10 1 One filter is special purpose device with limited arithmetic-logic unit and other is true programmable microprocessor

B76-10454
SERIAL-DATA CORRELATOR/CODE TRANSLATOR
L E Morgan
Mar 1977
KSC-11025 **Vol 1, No 4, p 505**
System consisting of sampling flip flop, memory (either RAM or ROM) and memory buffer correlates sampled data with predetermined acceptance code patterns, translates acceptable

code patterns to nonreturn-to-zero code and identifies data dropouts

B76-10455
UHF/MICROWAVE OSCILLATOR/AMPLIFIER
L L Kleinberg
Mar 1977
GSFC-12113 **Vol 1, No 4, p 505**

Circuit uses tunnel diode as negative resistance and bipolar transistor as an active device in conjunction with resistors and capacitors Transistor provides inductance required to produce oscillation and tuning Output is taken from transistor collector and avoids unwanted characteristics of two-terminal oscillator/amplifier

B76-10456
CAPACITIVELY-COUPLED DATA RECEIVER CLIPPER STAGE
F W Saunders (Singer Co)
Mar 1977
MSC-14989 **Vol 1, No 4, p 507**

Circuit technique compensates for dc offset and asymmetry in dc clipping levels, negates unbalance in input waveform that causes voltage offset at end of data word, blocks any dc component that is generated by asymmetrical operation of clipper and improves data threshold detection

B76-10457
BIASED-CIRCUIT DIGITAL DATA LINE RECEIVER
F C Fitzgerald (IBM)
Mar 1977
MSC-14967 **Vol 1, No 4, p 508**

Modified-interface circuit, consisting of input diodes, current sources, and emitter followers transfers data between digital electronic equipment and also aids circuit isolation when driver and all receivers but one are not powered Circuit rejects spurious noise signals without impeding valid signal transfer

B76-10458
LOW-POWER PROGRAMMABLE HIGH-VOLTAGE SUPPLY
D F Stout (Martin Marietta Corp) and R A Perala (Martin Marietta Corp)
Mar 1977
LANGLEY-11316 **Vol 1, No 4, p 508**

Converter is used to energize group of proportional-counter event-detection tubes Supply is programmed by using output signal of low voltage digital-to-analog converter Programming voltage ranges from 1 53 to 2 91 V in 127 0 0108 mV steps, and it is used to control converter high voltage output which ranges from 700 to 1,335 V in like number of increments

B76-10459
THICK-FILM PREAMPLIFIER
G C Bailey
Mar 1977
NPO-13416 **Vol 1, No 4, p 509**

Preamplifier with hybrid discrete components and integrated-circuit packaging is designed specifically for use as television image-tube output signal conditioner Circuit is fabricated on alumina substrate, measuring 0 5 by 0 5 by 0 0 1 5 inch using gold-base conductor with conductive gold crossovers and dielectric insulation

B76-10460
MICROPROGRAMED TELEMETRY PROCESSOR
L H Gordon (Hughes Aircraft Co) and J B Shackleford (Hughes Aircraft Co)
Mar 1977
ARC-11061 **Vol 1, No 4, p 511**

Minimum hardware, reliable processor responds rapidly to changing requirements simply by changes in contents of programmable read-only memory General purpose controller can transfer data onto and off of data bus perform logic and arithmetic manipulations, and store pertinent data in small internal random-access memory

B76-10461
SEMICONDUCTOR OHMIC CONTACT
F Z Hawrylo (RCA) and H Kressel (RCA)
Mar 1977
LANGLEY-11691 **Vol 1, No 4, p 512**

Contact formed on p-type surface of semiconductor laser has several advantages highly conductive degenerate region and narrow band gap provides surface for good metal-to-semiconductor contact, lattice parameter of GaAs is 5 6533 A improved lattice match eases interface strain which reduces interface cracking of semiconductor material

B76-10462
LOW-COST DUAL-FREQUENCY MICROWAVE ANTENNA
I Yu (Lockheed Electronics Co)
Mar 1977
MSC-16100 **Vol 1, No 4, p 513**

Antenna is circularly-polarized microwave device with high-band frequency and low-band frequency elements Relatively low impedance of low-band frequency element can be matched to desired impedance by adding etched matching network

B76-10463
ACTIVE RETRODIRECTIVE ANTENNA
R C Chernoff and R C Tausworthe
Mar 1977
NPO-13641 **Vol 1, No 4, p 514**

Active antenna is self-phasing array which transmits signal in direction of remote pilot source Word 'active means that transmitted power is generated by sources associated with antenna rather than by reflection of incident signal, as in passive retrodirective antenna Array is also known as self-focusing array

B76-10464
MULTIFREQUENCY, BROADBAND, DUAL-POLARIZED ANTENNA
K A Green (Microwave Res Corp)
Mar 1977
NPO-13866 **Vol 1, No 4, p 516**

Corrugated, conical horn ring-loaded antenna can be fed through vertex of cone with wideband waveguides, such as double-ridged rectangular or quad-ridged circular, or simply ring-loaded, corrugated waveguides Antenna is also fed through coupling apertures in side of cone at appropriate diameters

B76-10465
ANALOG-TO-DIGITAL CONVERSION FOR RADIX (-2)
S Zohar
Mar 1977
NPO-13093 **Vol 1, No 4, p 517**

Device, which converts directly from analog signal to its radix (-2) representation, is based on successive approximation approach

B76-10466
POWER SUPPLY WITH OPTICAL-ISOLATOR CONTROL
R H Baker (MIT) and J T Wheeler (MIT)
Mar 1977
HQN-10827 **Vol 1, No 4, p 519**

Power supply consists of several stages interconnected and programmed for required output In capacitor charging mode, transistor switches are closed Last stage is in series with rectifier that prevents current from flowing backward into circuit In capacitor discharge mode, transistor switches are closed, and voltage delivered to load is sum of voltages across capacitors

B76-10467
ACTIVE INRUSH-CURRENT LIMITER
R A Kichak
Mar 1977
GSFC-11789 **Vol 1, No 4, p 520**

By stretching turn-on time from approximately 1 to 200 ms, effects of inrush current (and of associated large current spikes) and current rate of rise (dI/dt) are made potentially less severe Limiter arrangement consists of time-variable impedance

connected in series between input dc power source return and power circuit of converter

B76-10468
ALL-DIGITAL SEQUENCE CORRELATOR
A Laderman
Mar 1977
NPO-13737 **Vol 1, No 4, p 521**

Correlator can handle long-length pseudonoise sequences by adding shift registers, counters and adders in 'tree configuration of basic 16-bit scheme Correlation coefficient of unity or zero is generated when all bits of sequence are received and positioned correctly in input shift register

B76-10469
RELATIVE STIFFNESS OF FLAT-CONDUCTOR CABLE
J D Hankins
Mar 1977
M-FS-23537 **Vol 1, No 4, p 522**

Bending moment data were taken on ten different cable samples and normalized to express all stiffness factors in terms of cable 5 1 cm in width Relative stiffness data and nominal physical characteristics are tabulated and presented in graphical form for designers who may be interested in finding torques exerted on critical components by short lengths of cable

B76-10470
TRANSFORMER DESIGN TRADEOFFS
W T McLyman
Mar 1977
NPO-13755 **Vol 1, No 4, p 523**

Technical memorandum includes transformer area product numbers which are used to summarize dimensional and electrical properties of C-cores, pot cores lamination, powder cores and tape-wound cores To aid in core selection, comparison of five common core materials is presented to indicate their influence on overall transformer efficiency and weight

B76-10471
DIELECTRIC COVERED ANTENNAS
J F Lindsey (McDonnell-Douglas Corp)
Mar 1977
MSC-16186 **Vol 1, No 4, p 523**

Because of simplicity and adaptability, new computer program incorporates modified version of plane-wave transmission theory including multiple internal reflections and effects of ground-plane reflection Model assumes isotropic hemispherical radiator from point source with individual rays incident upon several dielectric materials

B76-10472
ELECTROSTATIC ANALYSIS OF CHARGE-COUPLED STRUCTURES
J D Gassaway (Mississippi State Univ)
Mar 1977
M-FS-23507 **Vol 1, No 4, p 524**

Package of three computer programs performs two-dimensional electrostatic analysis to determine efficiency of charge transfer One program can be used to analyze three-electrode charge-coupled device input/output gates and other two programs can be used to analyze two-phase structures containing two or four electrodes with periodic boundary conditions

02 ELECTRONIC SYSTEMS

B76-10016
ULTRAVIOLET FIRE DETECTOR
J E Turnage (McDonnell-Douglas Corp), R M F Linford (McDonnell-Douglas Corp), and S D Cornish (McDonnell-Douglas Corp)
Mar 1976
M-FS-21577 **Vol 1, No 1, p 23**

System is capable of detecting ultraviolet light emitted by match size flame at distance of 10 ft System is not affected by high energy or particulate radiation and is therefore particularly suited for applications around nuclear plants and X-ray equipment

B76-10017
DATA-STORAGE COMPRESSION SCHEME
P M Salomon and L F Schmidt
Mar 1976
NPO-13488 **Vol 1, No 1, p 24**

System uses scheme which does not respond to redundant data Encoded sensor output signals are transferred to central processing unit only when change occurs in encoded 12-bit word

B76-10018
ALL-WEATHER ICE INFORMATION SYSTEM
R J Schertler, R A Mueller, R J Jirberg D W Cooper, J E Heighway, A D Holmes, R T Gedney and H Mark
Mar 1976
LEWIS-12638 **Vol 1, No 1, p 25**

Heart of system consists of two major components side-looking airborne radar system for detecting ice cover and type, and modified short pulse S-band radar system for simultaneously determining ice cover regardless of cloud cover

B76-10019
GRAPHIC-TO-DIGITAL CONVERSION SYSTEM
F L Rosenthal (Rockwell Intern Corp)
Mar 1976
M-FS-24410 **Vol 1, No 1, p 26**

Computer-controlled system allows operator to record only those data points selected It consists of commercially available X-Y plotter computer, and A/D and D/A converters New component is strain gage controller and amplifier which can be adapted to existing systems

B76-10020
SENSOR FOR ANALOG SPEED CONTROLS
A G Birchenough
Mar 1976 See also NASA-TM-X-3200 (N75-17577)
LEWIS-12597 **Vol 1, No 1, p 28**

System has speed control accuracy within approximately 0 001 percent Accuracy is limited only by crystal reference oscillator, however effect is negligible on original system stability and transient response Design can be adapted to other systems and provides compromise between either fully digital or fully analog systems

B76-10021
SELECTIVE IMAGE ENHANCEMENT
R C Gonzalez (Tennessee Univ) and B A Fittes (Tennessee Univ)
Mar 1976
M-FS-23364 **Vol 1, No 1, p 29**

Digital technique for television systems can be used with remote manipulators Algorithm is used to divide image into N-by-N picture elements which may be individually enhanced Enhancement may be controlled with joystick Similar arrangement simplifies remote manipulator operation

B76-10022
REMOTE ACCESS OF MODEM BY DIGITAL CONTROL
H Lopez
Mar 1976
GSFC-11943 **Vol 1, No 1, p 30**

Semiautomated system enables operator to measure overall quality of communications link between console (point A) and far-end location (point B) By transmitting test pattern from point A receiving it at point B and transmitting back to point A in loopback, unassisted operator can evaluate overall link performance

B76-10023
PULSE AMPLITUDE DISCRIMINATOR THRESHOLD CALIBRATION
D P Peletier (Johns Hopkins Univ)
Mar 1976
GSFC-11912 **Vol 1, No 1, p 31**

Closed-loop digital circuit insensitive to drift with age, monitors input signals in particle detector Basic elements of calibrator are clock circuit, weighting circuit, integrator, and chopper

B76-10024
ELECTRO-OPTICAL LIQUID DEPTH SENSOR
D B Heppner (General Dynamics Corp) and S O Atwood (General Dynamics Corp)
Mar 1976
M-FS-22921 **Vol 1, No 1, p 32**

Transducer utilizes absorptive properties of water to determine variations in depth without disturbing liquid Instrument is inexpensive simple, and small and thus can be used in lieu of direct graduated scale readout or capacitive ultrasonic resistive or inducive sensors when these are impractical because of complexity or cost

B76-10025
GENERAL-PURPOSE DATA LINK
M J Dinkins (GE)
Mar 1976
M-FS-22714 **Vol 1, No 1, p 33**

Communications modem comprising transmitter, demodulator modulator, and receiver is compatible with telephone line, video pair, or 1,250 ohm twisted wire pair It permits wide range of input and output voltages and flexible data rates, and it has provision for computer interface

B76-10026
UNICHROMATIC-CARRIER COLOR-TV SYSTEM
K H Vorhaben (Lockheed Electronics Co) and P C Lipoma (Lockheed Electronics Co)
Mar 1976
MSC-14683 **Vol 1, No 1, p 34**

Optical system consists of two filter layers with each layer composed of transparent stripes alternating with dichroic color filter strips System produces color multiplexed light signal by vertically orienting dichroic filter stripes perpendicular to scan lines of image tube

B76-10027
SERIAL-TO-PARALLEL COLOR-TV CONVERTER
T W Doak (Philco-Ford Corp) R B Merwin (Philco-Ford Corp) S E Zuckswert (Philco-Ford Corp), and W Sepper (Philco-Ford Corp)
Mar 1976 See also NASA-CR-141891 (N75-26203)
MSC-14844 **Vol 1, No 1, p 35**

Solid analog-to-digital converter eliminates flicker and problems with time base stability and gain variation in sequential color TV cameras Device includes 3-bit delta modulator, two-field memory timing, switching, and sync network, and three 3-bit delta demodulators

B76-10028
TRACKING SYSTEM FOR MOVING SUBJECTS
L N Mogavero, E G Johnsen (Natl Bur of Standards), J M Evans, Jr (Natl Bur of Standards), and J S Albus (Natl Bur of Standards)
Mar 1976
HQN-10880 **Vol 1, No 1, p 36**

Electronic system automatically focuses camera or spotlight on moving object Subject is equipped with miniature ultrasonic or radio transmitter, its signal is picked up by two or more detectors, is phase detected and fed into computer which determines position of subject and sends command signals to servo for camera or spotlight

B76-10029
READOUT METHOD FOR STORED INFORMATION
G W Lewicki
Mar 1976
NPO-13243 **Vol 1, No 1, p 37**

Readout technique increases density of stored information for projection onto facsimile reproduction Data stored on line structures is scanned at 90 deg angle over area larger than recorded format to ensure complete recovery of information

B76-10160
AUTOMATIC FIRE/WEATHER DATA STATION
H Lum, Jr
Aug 1976
ARC-10993 **Vol 1, No 2, p 169**

Prototype unmanned integrated system collects and processes fire-index data System is based on state-of-the-art technology, utilizes low-cost hardware, and is highly reliable

B76-10161
UNBALANCED QUADRIPHASE DEMODULATOR
H S Kobayashi and S P Bradfield, III
Aug 1976
MSC-14840 **Vol 1, No 2, p 170**

New demodulator for suppressed carrier pulse-code-modulated signals represents incoming signals as vectors

B76-10162
FREE-SPACE MICROWAVE-POWER TRANSMISSION
W C Brown (Raytheon Co)
Aug 1976
M-FS-23443 **Vol 1, No 2, p 171**

Laboratory-scale wireless transmission of microwave power approaches fifty-four percent efficiency DC is converted to a 2 45-GHz signal and is transmitted through horn antenna array microwave signal is received at rectenna and is simultaneously collected and rectified back to dc at receiving sites dc is then processed for wired distribution

B76-10163
LONG BINARY FRAME SYNC WORDS
B K Levitt
Aug 1976
NPO-13727 **Vol 1, No 2, p 172**

Prefixes of pseudonoise sequences for frame-synchronization of binary PSK telemetry require only small portion of sync words to be stored in memory

B76-10164
DEMODULATOR AIDS SYNCHRONIZATION
M K Simon and J G Smith
Aug 1976
NPO-13605 **Vol 1, No 2, p 172**

Decision-feedback loop synchronizes multiple-amplitude and phase-shift keyed signals

B76-10165
ANALOG-TO-BINARY CONVERSION OF VIDEO DATA
M H Acuna and C J Pellerin
Aug 1976
GSFC-11918 **Vol 1, No 2, p 173**

Accurate and controllable technique for converting television information to binary form has been developed for systems requiring video signals to be used with automatic data-processing equipment High-speed comparator circuit ignores out-of-focus features and is insensitive to overall brightness changes in picture

B76-10166
DIGITAL VIDEO IMAGE SYSTEM
P L Neely (Computer Sci Corp) and R M Brown (Computer Sci Corp)
Aug 1976
M-FS-23322 **Vol 1, No 2, p 174**

Interactive recording and display device acts as very-high-speed data-input/output interface between analog (video) signals and standard digital-computer components System can be used

with various picture and memory sizes and can be controlled manually or by computer

B76-10167
INTERACTIVE IMAGING AND DATA PROCESSING
H Alsberg, R Nathan, and J H Morecroft
Aug 1976
NPO-13655 **Vol 1, No 2, p 175**

Image processing method is capable of contrast enhancement, noise filtering, and photometric distortion removal in near real time System uses digital image integration and digital video recorder as image buffer Each frame of data is entered into memory, registers provide readout of stored TV frame

B76-10168
MULTIPLANE BINOCULAR VISUAL DISPLAY SYSTEM
W D Chase
Aug 1976
ARC-10808 **Vol 1, No. 2, p 176**

Electro-optic system is interfaced with digital computer in flight simulator to generate simultaneous multiple-image planes in real time System may have applications with other display and remote-control systems

B76-10319
MANCHESTER TRANSITION TRACKING LOOP (MTTL)
A Cellier (TRW, Inc), L N Ma (TRW, Inc), and D C Huey (TRW, Inc)
Jan 1977
MSC-14842 **Vol 1, No 3, p 343**

In new tracking loop separate phase detection algorithm is incorporated for acquisition, programmed acquisition-to-track sequence includes automatic bandwidth switching Additionally, system has very effective phase detection signal-to-noise ratio and can operate at any rate by changing master clock frequency All system parameters remain constant

B76-10320
INEXPENSIVE LOW-VOLTAGE SOLID-STATE ALARM
D H Hardy
Jan 1977
LEWIS-12544 **Vol 1, No 3, p 344**

Monitor/alarm with audio and visual warning output can be used to warn when prescribed limits of temperature, liquid level, pressure, or similar properties are exceeded Device is more compact, lighter, and less expensive to manufacture than typical alarm circuits

B76-10321
VOLTAGE-OFFSET REDUCTION IN DATA TRANSMITTERS
C E Theall (Singer Co)
Jan 1977
MSC-14933 **Vol 1, No 3, p 345**

Current source, which consists of inductor and two silicon diodes is used to reduce output voltage offset and to make circuit less sensitive to conductance differences in output transistors

B76-10322
BINARY/BCD-TO-ASCII DATA CONVERTER
A J Miller
Jan 1977
GSFC-12044 **Vol 1, No 3, p 346**

Converter inputs multiple precision binary words, converts data to multiple precision binary-coded decimal, and routes data back to computer Converter base can be readily changed without need for new gate structure for each base changeover

B76-10323
PN RANGING/TELEMETRY TRANSMISSION
L F Deerkosky
Jan 1977
GSFC-12017 **Vol 1, No 3, p 347**

System can transmit range-indicating pseudonoise (PN) codes and simultaneously transmit auxiliary information as binary data at a rate at least on order of pseudonoise chipping rate PN code is modulated by data stream with relatively low bit rate Data stream with high bit rate can be transmitted in same frequency band as PN ranging code

B76-10324
RECEIVER PERFORMANCE EVALUATOR
J A Cusack (Motorola Inc) and H R Meyering (Motorola Inc)
Jan 1977
NPO-13701 **Vol 1, No 3, p 348**

Signal-to-noise ratio is estimated and bit errors in Manchester-encoded data streams are detected, using microprocessor-based test set

B76-10325
CONCATENATED ALGEBRAIC DECODER
Innovator not given (Raytheon Co) Jan 1977
MSC-14058 **Vol 1, No 3, p 349**

Technique for manipulating digital data consists of mating two separate coding/decoding methods to produce hybrid inner-code/outer-code system Interactive digital circuitry is used to manipulate casually related digital data

B76-10326
ORAL ANNUNCIATOR WITH PROGRAMMABLE VOCABULARY
D Paslay (Garrett Corp) and P Wong (Garrett Corp)
Jan 1977
MSC-14798 **Vol 1, No 3, p 350**

Voice (analog) signal is converted to its digital equivalent and stored in solid state memory Upon command memory becomes part of annunciator system which includes other digital logic, digital-to-analog converter, and audio amplifier

B76-10327
SIGNAL PROCESSING AND DISPLAY FOR ELECTROCHEMICAL DATA
R N Young and J R Wilkins
Jan 1977 See also B73-10523
LANGLEY-11922 **Vol 1, No 3, p 351**

Two electrochemical electrodes provide signals, apparatus automatically determines reaction end point and displays lag period in time or cell concentration Apparatus can be used with standard pH reference anode and platinum anode or with redox electrodes

B76-10328
MICROPROGRAMMING FOR REAL-TIME DATA ACQUISITION
F J Patella (IBM)
Jan 1977
KSC-11027 **Vol 1, No 3, p 352**

Transmit microcode trap logic is conditioned by preset clock Measurement request or issuance of command is controlled by set of software-initialized polling tables Receive microcode trap logic is conditioned by transmit/receive hardware when response is returned on data bus

B76-10329
SUBCARRIER SIGNAL COMBINER FOR ARRAYED ANTENNAS
H C Wilck and R A Winkelstein
Jan 1977
NPO-13723 **Vol 1, No 3, p 353**

Quadrature correlation for automatic signal phasing and variable delay is used to combine signals for improved signal-to-noise ratio

B76-10330
PREVENTION OF DESIGN FLAWS IN MULTICOMPUTER SYSTEMS
J M Romberg (McDonnell-Douglas Corp)
Jan 1977 See also NASA-CR-147657 (N76-23889)
MSC-14920 **Vol 1, No 3, p 354**

Report summarizes research on failure mode analysis for multicomputer systems where two or more computers may serve as redundant set Failure modes such as data bus monopoliza-

tion, shutdown due to transients loss of control system equalization memory alteration, and software errors are discussed

B76-10473
DIRECT-READING INDUCTANCE METER
R B Kolbly
Mar 1977
NPO-13792 **Vol 1, No 4, p 527**

Meter indicates from 30 nH to 3 micro H Reference inductor of 15 micro H is made by winding 50 turns of Number 26 Formvar wire on Micrometal type 50-2 (or equivalent) core Circuit eliminates requirement for complex instrument compensation prior to taking coil inductance measurement and thus is as easy to operate as common ohmmeter

B76-10474
VIDEO SIMULATOR WITH ELECTRONIC RANGING
W Kraemer (Singer Co)
Mar 1977
MSC-14965 **Vol 1, No 4, p 528**

Gimbal orientation, raster shrinkage and deflection, and track movement are used to simulate attitude and range Key component in system is video digitizer that converts vidicon camera signal to digital form, processes it to reduce image size, and reconverts processed data to analog signal for display on cathode ray tube

B76-10475
INFRARED RANGE SENSOR
J W Hill (Stanford Res Inst) and J R Woodbury (Stanford Res Inst)
Mar 1977
ARC-10885 **Vol 1, No 4, p 529**

Sensor employs triangulation technique to locate objects that lie in intersections of four emitted beams of light and fields of view of four phototransistors Signals from individual phototransistors are filtered and identified by individual synchronous detectors one for each beam-intersection point

B76-10476
IRONLESS-ARMATURE BRUSHLESS MOTOR
R L Fisher (Sperry Rand Corp)
Mar 1977
GSFC-11880 **Vol 1, No 4, p 530**

Device uses 12-pole samarium cobalt permanent-magnet rotor and three Hall-effect sensors for commutation In prototype motor, torque constant (3-phase delta) is 65 oz-in/amp, electrical time constant (L/R) is 0 2 x 0 001 sec and armature resistance is 20 ohms

B76-10477
FULL-COLOR HYBRID DISPLAY
W D Chase
Mar 1977
ARC-10903 **Vol 1, No 4, p 531**

System presents realistic and properly proportioned image of runway with its associated lights as it appears at dusk or at night Display employs high resolution cathode ray tube and color wheel to produce colored lights from computer generated signals Lights are then superimposed on conventional television display of runway

B76-10478
EFFECTS OF MISMATCH ON GROUP DELAY OF MICROWAVE TRANSMISSION
R W Beatty and T Y Toshi
Mar 1977
NPO-13863 **Vol 1, No 4, p 532**

Calculation method can be applied to transmission lines operating in TEM mode or to single-mode propagation in waveguides Derived data are useful for estimating limits on variation of group delay with frequency or in determining how much discontinuity reduction is necessary to achieve given accuracy in predicting group delay

B76-10479
REDUCTION OF COMPUTER POWER INTERRUPTIONS
C C Oleson (Rockwell Intern Corp)
Mar 1977
MSC-16136 **Vol 1, No 4, p 533**

Inexpensive latching relays incorporating one-second time delay prove effective for maintaining system power in place of computer facility automatic shutdown sensors that are activated by minute power surges or spikes in 60 Hz input signal

B76-10480
INSTRUMENTATION FOR MEASURING LOW-LEVEL CURRENTS/VOLTAGES
R G Richmond
Mar 1977
MSC-14855 **Vol 1, No 4, p 534**

Instrumentation consists of high-output resistance voltage measuring amplifier (electrometer) and current-to-frequency converter (current digitizer) coupled to set of timers and counters Digital display of time-averaged signals with amplitudes varying over 11 decades is possible

B76-10481
TRACKING A PHASE-SHIFT-KEYED SIGNAL
S Villarreal, S D Lenett, H S Kobayashi and J F Pawlowski
Mar 1977
MSC-16170 **Vol 1, No 4, p 535**

In detector, phase shifter is used to generate negative phase shift opposing detected phase angle This produces converted series sideband and component carrier with residual carrier signal and converted series sideband and component carrier added together to produce tracking signal

B76-10482
ADVANCED IMAGING COMMUNICATION SYSTEM
E E Hilbert and R F Rice
Mar 1977
NPO-13545 **Vol 1, No 4, p 536**

Key elements of system are imaging and nonimaging sensors, data compressor/decompressor, interleaved Reed-Solomon block coder, convolutional-encoded/Viterbi-decoded telemetry channel, and Reed-Solomon decoding Data compression provides efficient representation of sensor data and channel coding improves reliability of data transmission

B76-10483
FLEXIBLE HIGH-SPEED INSTRUMENTATION SYSTEM
F Bartoli and R W Borek Sr
Mar 1977
FRC-10110 **Vol 1, No 4, p 537**

Remote multiplexer/demultiplexer digital instrumentation system, which is suitable to both airborne and ground-based data acquisition/process control applications can be employed in a variety of research and flight test applications where great flexibility to accommodate changes in number of parameters, data sampling rates, and signal conditioning is required

B76-10484
INDUCTION MOTOR ANALYSIS
G Bollenbacher
Mar 1977
LEWIS-12687 **Vol 1, No 4, p 538**

FORTRAN program calculates torque speed characteristics electrical characteristics magnetic flux densities, and weight plus other parameters Input to program consists of physical dimensions, winding temperatures, winding description material characteristics, and electrical design parameters

03 PHYSICAL SCIENCES

B76-10030
LASER EXTENSOMETER

P L Stocker (Rockwell Intern Corp) and H L Marcus (Rockwell Intern Corp)
Mar 1976
M-FS-19259 **Vol 1, No 1, p 39**

Drift-compensated and intensity-averaged laser-based system uses optical and photoelectric effects for precise measurement of small thermally-induced size changes Final output signal is directly proportional to size of sample shadow and independent of laser intensity detector dark current, and lateral motion of sample

B76-10031
LASER-DOPPLER MEASUREMENT OF AIR TURBULENCE
R M Huffaker
Mar 1976
M-FS-23155 **Vol 1, No 1, p 40**

Laser-Doppler system with 10-micron wavelength tracks 1-micron dust particles to measure air turbulence System is designed for use at airports to measure and track aircraft trailing vortexes

B76-10032
IMPROVED EINZEL LENSES
R K Hart (Georgia Inst of Tech)
Mar 1976
M-FS-23115 **Vol 1, No 1, p 41**

New insulator configuration simplifies construction of three-electrode electrostatic electron lenses in which center electrode is at high electrical potential Spherical sapphire insulators are used in lieu of conventional tubular ceramic or plastic insulators in Einzel lens assembly

B76-10033
STEPPING OPTICAL PATH DIFFERENCE IN AN INTERFEROMETER
R A Schindler
Mar 1976
NPO-13569 **Vol 1, No 1, p 42**

Stepping method permits higher amplitude modulation of secondary mirror of Fourier interferometer Amplitude of mirror motion is limited only by available voltage drive on error-correcting actuator Closed-loop controller provides servo error voltage linearly proportional to offset from proper null position Bidirectional counter serves to count number of reference laser fringes offset from null position

B76-10034
LIGHT PIPES FOR LED MEASUREMENTS
S R Floyd and E F Thomas, Jr
Mar 1976
GSFC-11887 **Vol 1, No 1, p 43**

Light pipe directly couples LED optical output to single detector Small area detector measures total optical output of diode Technique eliminates thermal measurement problems and channels optical output to remote detector

B76-10035
ELLIPSOMETER FOR MEASUREMENT IN ULTRAHIGH VACUUM
H U Walter, L A Weitzenkamp, and P N Peters
Mar 1976
M-FS-23130 **Vol 1, No 1, p 44**

Ellipsometer, used with ultrahigh vacuum, allows measurement of varied angles of incidence Vacuum chamber, directly incorporated into optical bench systems, allows varied angle measurements to be taken through same region of a window

B76-10036
CALIBRATION SOURCE FOR SENSITIVE OPTICAL DETECTORS
B T Baugh
Mar 1976
LANGLEY-11625 **Vol 1, No 1, p 45**

Light-emitting diode (LED), maintained near room temperature stabilizes wavelength of emitted light and calibrates photo-optical detectors

B76-10037
MEASUREMENT OF TRANSIENT REFLECTANCE
J M Zwiener
Mar 1976
M-FS-23160 **Vol 1, No 1, p 46**

Real-time reflectometer, adjusted to a fraction of a second monitors transient effects and allows sample to be exposed to environment continuously Reflectance and reference signals share same optical path, minimizing extraneous effects

B76-10038
IMPROVED COLLIMATOR FOR IMAGING SYSTEM
A M Holladay and C T Huggins
Mar 1976
M-FS-22863 **Vol 1, No 1, p 47**

System s collimator, consisting of metal plate with many small-diameter holes and fiber optics scintillator, can increase system resolution to 1 mm and reduce scintillation loss to 25 percent

B76-10039
HOLOGRAPHY WITH SURFACE PLASMA WAVES
J J Cowan (Natl Acad of Sci)
Mar 1976
M-FS-22040 **Vol 1, No 1, p 48**

New technique utilizes reflection-type diffraction grating of type generally used in grating spectrometers Grating is coated with thin layer of high-resolution recording medium, having absorption coefficient low enough to prevent incident light absorption before it is reflected by metal layer

B76-10040
BEAM PATTERNS OF LIGHT-EMITTING DIODES
E F Thomas, Jr and S R Floyd
Mar 1976
GSFC-11890 **Vol 1, No 1, p 49**

IR-sensitive film, placed at various source-to-detector distances, records output beam pattern of LED Information is then used to determine optimum position of detector surface for maximum radiation interception

B76-10041
IMPROVED INTERFEROMETER BEAM SPLITTER
R A Schindler
Mar 1976
NPO-11932 **Vol 1, No 1, p 50**

Cat's-eye retroreflector attached to motor driven lead screw allows low-frequency changes in optical path Moving-coil actuator attached to other retroreflector allows mid-frequency movements High-frequency movements are achieved by employing piezoelectric transducer attached to secondary mirror of same retroreflector

B76-10042
DETERMINATION OF RADIATIVE CURRENT IN LED'S
E F Thomas
Mar 1976
GSFC-12034 **Vol 1, No 1, p 51**

Directly measureable quantity of radiative output in LED s is total forward current When applied forward voltage is below 1 05 V the forward current is primarily nonradiative and varies with forward voltage as exp(qV/2kT), when q is the charge, V is applied voltage, K is Boltzmann s constant, and T is operating temperature

B76-10043
VOLTAGE CONTROL FOR CORONA CHARGING THERMOPLASTICS
R S Mezrich (RCA)
Mar 1976
M-FS-23102 **Vol 1, No 1, p 52**

Controlled voltage is accomplished by placing metal plate with hole in it near surface of film During charging, thermoplastic will accumulate charge only until it reaches plate voltage, after that, all charge will be deflected to plate

B76-10044
PERMANENT HOLOGRAPHIC STORAGE MEDIUM
R A Gange (RCA)
Mar 1976
M-FS-22588 **Vol 1, No 1, p 52**

Storage unit is electrostatically-charged multilayered laminate Ability of system to store information in holographic forms is due to specific electrical optical, and chemical characteristics of its materials

B76-10045
ELECTRODE STRUCTURE FOR UNIFORM CORONA DISCHARGE
R A Gange (RCA) and C C Steinmetz (RCA)
Mar 1976
M-FS-22617 **Vol 1, No 1, p 53**

Single corona-discharge needle is used to apply uniform charge to thermoplastic medium in holograph-storage system Needle is connected to flat transparent electrode that is parallel to thermoplastic

B76-10046
ANAMORPHIC LENS FOR TRACKING SYSTEM
R H Burns and L F Schmidt
Mar 1976
NPO-13062 **Vol 1, No 1, p 54**

Lens has 2 1 focal-length ratio, consists of three spherical and two cylindrical elements, and is 7 6 cm in length When used in conjunction with image dissector tube, expected root-mean-square noise equivalent angle is approximately 8 arc seconds

B76-10047
SOLAR SELECTIVE SURFACES
G McDonald, R W Lauver, P Baumeister (Rochester Univ), and A C Benning (Harshaw Chem Co)
Mar 1976
LEWIS-12614 **Vol 1, No 1, p 55**

Method consists of applying high absorptance coating onto thin film or foil of low emittance material Thin film surface is then bonded to collector panel surface

B76-10048
TWO-DIMENSIONAL PHOTON DETECTOR
J G Timothy (Harvard Coll Obs) and R L Bybee (Ball Bros Res Corp)
Mar 1976
M-FS-23325 **Vol 1, No 1, p 56**

Device incorporates set of cascaded microchannel-array plates in proximity focus with two sets of mutually-orthogonal linear anodes Technique allows data from N x M picture elements to be recorded with only N + M amplifiers

B76-10049
POLISHING TECHNIQUE FOR BERYLLIUM MIRROR
J F Froechtenigt (Martin Marietta Corp)
Mar 1976
M-FS-22923 **Vol 1, No 1, p 57**

Performance tests accomplished by inserting entire X-ray telescope and polished mirror into vacuum line 67 m long and taking photographs of an X-ray resolution source indicate that polishing increases mirror efficiency from 0 06 percent for X-rays at 0 8 nm and increases resolution from 15 to 3 75 arc-seconds

B76-10050
STANDARD AEROSOLS FOR PARTICLE VELOCIMETERS
A Deepark, R Ozarski and J A L Thomson
Mar 1976
M-FS-23075 **Vol 1, No 1, p 58**

System consists of laser-scattering counter (LSC) and photographic system Photographic system provides absolute method of measuring aerosol size-distribution independently of their light scattering properties LSC comprises 1-mW He/Ne laser input optics, collecting optics, photodetector, and signal-processing electronics

B76-10051 **Vol 1, No 1, p 58**
OPTICAL BIAS ASSEMBLY
R Weagant (Honeywell, Inc) and N Aldrich (Honeywell Inc)
Mar 1976
MSC-14412

Assembly used to achieve linear response in optical detection system consists of tungsten lamp source optical filters, fiber optics bundle aperture mask relay lens, and folding mirror Tungsten lamp source provides sufficient background illumination to make input optical flux small compared to background

B76-10052
VIDEO DISPLAY SYNTHESIZER
C Grant (Martin Marietta Corp)
Mar 1976
MSC-14620 **Vol 1, No 1, p 60**

Dc command voltages from analog computer can be displayed as four dots and two crosshairs configured to provide illusion of depth via planar or stereo presentations in monochrome or color and if stereo using dual monitors, single monitor with split screen or single monitor with color separation

B76-10053
MICROCHANNEL DETECTOR ARRAY FOR X-RAYS AND UV
J G Timothy (Harvard Coll Obs) and R L Bybee (Ball Bros Res Corp)
Mar 1976
M-FS-23324 **Vol 1, No 1, p 61**

Device employs sensitive photoelectric electrodes and solid-state memory can be used at visible UV and X-ray wavelengths, includes nonmagnetic proximity focusing, and is immune to high energy charged-particle background

B76-10054
VIDICON INTENSIFIER
R P Carpentier (Westinghouse Elec Corp), J P Pietrzyk (Westinghouse Elec Corp), R R Beyer (Westinghouse Elec Corp), and J S Kalafut (Westinghouse Elec Corp)
Mar 1976
NPO-11912 **Vol 1, No 1, p 62**

Computer-designed sensor, consisting of single-stage electrostatically-focused triode image intensifier provides high quality imaging characterized by exceptionally low geometric distortion low shading and high center-and-corner modulation transfer function

B76-10055
CALIBRATION OF IMAGE DISSECTOR TUBES
E E Klingman, III
Mar 1976
M-FS-22208 **Vol 1, No 1, p 63**

Technique employs computer-controlled light-emitting diode (LED), precision machined mask and analog-to-digital coverter (ADC) Computer turns on LED which floods masked face of tube Intensity pattern, generated as tube is electromagnetically swept is fed to ADC which controls tube calibration

B76-10056
HYBRID-MODE THERMIONIC CONVERTER
N S Rasor (Energy Res and Develop Admin) and E J Britt (Energy Res and Develop Admin)
Mar 1976
HQN-10876 **Vol 1, No 1, p 64**

Converter's collector electrode has uniform low work-function surface and operates at sufficiently low temperature to produce negligible electron emission Emitter electrode has main region which has intermediate work-function and auxiliary region which has relatively high work-function surface

B76-10057
CONVERT TECHNIQUE AND COMPUTER PROGRAM FOR CALCULATING PHOTOGRAPHIC FILM-DENSITY VARIATIONS
C W Ohlhorst
Mar 1976

LANGLEY-11873 **Vol 1, No 1, p 65**

Binary-coded-decimal microdensitometer output is converted into number representing film-density difference between unexposed film border and any data point on photograph while also correcting for atmospheric backscattering and lens vignetting

B76-10169
DOUBLE-EXPOSURE HOLOGRAPHIC INTERFEROMETER
F R Livingston
Aug 1976
NPO-13796 **Vol 1, No 2, p 179**

Expensive optical-grade components in holographic interferometer are replaced with plastic test section and large-aperture spherical mirror to reduce distortions introduced by imperfections and cylindrical shape of plastic Instrument is used for shock-tube gas density studies and is adaptable to wind-tunnel studies of vehicle windshields and other testing

B76-10170
TWO-WAVELENGTH DYE LASER
E V Browell
Aug 1976
LANGLEY-12012 **Vol 1, No 2, p 180**

Double-pulse laser utilizes existing optical components in unique design and is used in DIAL (differential absorption LIDAR) experiments to remotely detect pollutant and trace gases in atmosphere It can be used with any double-pulsed pump laser or two single-pulse lasers that can be sequentially pulsed within short period of time

B76-10171
PHOTOREFRACTIVE PAGE COMPOSER
C M Verber (Battelle Mem Inst)
Aug 1976
M-FS-23419 **Vol 1, No 2, p 181**

Optical information-storage device is small, easy to operate, and has low optical losses Device utilizes optical system in which storage medium, a plate of photosensitive material changes its refractive index upon exposure to light Major design feature is that page-composer plate does not require complete erasure between scans

B76-10172
WIND VELOCITY MEASUREMENT
W C Cliff R M Huffaker, W K Dahm, T R Lawrence (Lockheed Missiles and Space Co) M C Krause (Lockheed Missiles and Space Co), and J S L Thomson (Phys Dyn Corp)
Aug 1976
M-FS-23362 **Vol 1, No 2, p 182**

Homodyne laser-Doppler system determines three-component wind velocity at altitudes of several kilometers in clear-air conditions There is no need for deployment of towers, radiosondes or for seeding airflows

B76-10173
COMBINED GAAS LASER OUTPUTS
E M Rutz (IBM)
Aug 1976
M-FS-23397 **Vol 1, No 2, p 183**

Technique for combining outputs of array of small semiconductor lasers increases total output power while relaxing fabrication tolerances to make manufacture potentially less costly Advantage of free-running mode is that spacing between junction-diode lasers is less critical than for conventional, phase-coherently coupled arrays

B76-10174
AIRPORT LASER-DOPPLER
E W Coffey (Lockheed Missiles and Space Co), C E Craven (Lockheed Missiles and Space Co), B B Edwards (Lockheed Missiles and Space Co), C C Huang (Lockheed Missiles and Space Co), M C Krause (Lockheed Missiles and Space Co) T R Lawrence (Lockheed Missiles and Space Co), L K Morrison (Lockheed Missiles and Space Co), K R Shrider (Lockheed Missiles and Space Co), and D J Wilson (Lockheed Missiles and Space Co)
Aug 1976
M-FS-23423 **Vol 1, No 2, p 183**

Laser system remotely senses and tracks aircraft-wake turbulence Other potential applications include long-range (remote) detection of airflow monitoring smokestack exit flow velocities and observing winds at altitude

B76-10175
ANALOG DATA RECORDING ON MNBI FILM
J E Guisinger and G W Lewicki
Aug 1976
NPO-13302 **Vol 1, No 2, p 184**

High coercive-force films have reduced sensitivity to wall-domain motion and can record at higher spatial frequencies Tracks switched in high coercive-force films have track widths independent of applied magnetic field Upper spatial frequency limit recorded by Curie-point switching in alternating field is greater

B76-10176
LOW-THRESHOLD LIGHT-EMITTING-DIODE LASER
F Z Hawrylo (RCA) and H Kressel (RCA)
Aug 1976
LANGLEY-11477 **Vol 1, No 2, p 185**

Technique, which consists of reducing bandgap change at heterojunction to 0 1 eV and avoiding deep-level impurities such as Si and Ge, produces low-threshold laser diodes which are made from (AlGa)As and emit in visible spectrum

B76-10177
BEAM SPLITTER/COMBINER
W Leeb (Natl Res Council)
Aug 1976
GSFC-12083 **Vol 1, No 2, p 186**

Device uses total internal reflection in wedge configuration to avoid interference caused by unwanted, stray reflected beams and is particularly suited for laser heterodyne systems uses in communications, radar, radiometry and spectroscopy

B76-10178
OPTICAL ALINEMENT SYSTEM
N L Thomas (Lockheed Missiles and Space Co)
Aug 1976
ARC-10932 **Vol 1, No 2, p 187**

Technique allows geometric center of light source, such as sun laser, or solar simulator, to be alined with mirror quickly and in daylight Source is alined by precisely superimposing colored images of source, as viewed along two different paths

B76-10179
FIELD DISTRIBUTION IN A THIN LENS
C H Chi (Perkin-Elmer Corp)
Aug 1976
LANGLEY-11392 **Vol 1, No 2, p 188**

Quasi-optical formulation gives an optical field distribution by computing only two terms First term represents geometrical optics effect, and second term represents diffraction effect, thus mathematical expression is simplified, and considerable computer time is saved

B76-10180
SIMPLIFIED DEFLECTION-COIL LINEARITY TESTING
G P Kramer (Sperry Rand Corp)
Aug 1976
M-FS-23400 **Vol 1, No 2, p 189**

Mask placed over face of image-dissecting photomultiplier tube has precision array of pinholes that permit light to impinge on tube at known points Signals are fed to deflection coil which sweeps beam across each point without complex operator procedures

B76-10181
CONTRAST ENHANCEMENT OF TRANSPARENCIES
A R Shulman and S H Lee (California Univ)
Aug 1976
GSFC-11989 **Vol 1, No 2, p 190**

System can enhance or reduce contrast of photographic transparency for printing or projection by using constructive and destructive interference of collimated laser beam System is potentially less expensive than electronic CRT methods and is more accurate than trial-and-error manual techniques

B76-10182
FACETED SOLAR ENERGY COLLECTORS
D R Segna
Aug 1976
MSC-12687 **Vol 1, No 2, p 191**

Two concepts enhance efficiency and flexibility of solar collectors faceting collector surface and adding coloring agent to working fluid Collector can be placed on existing structures and oriented to take advantage of position of sun By adding coloring agent to working fluid total absorbance can be increased and altered if required

B76-10183
DOUBLE-FOCUSING MASS SPECTROMETER
C E Giffin A O Nier, and L M Sieradski
Aug 1976
NPO-13663 **Vol 1, No 2, p 192**

Device uses lighter, easily alined, magnet assembly to provide field required to interact with ion beam It has no separate duct instead evacuated duct is formed by pole pieces which support vacuum pump Magnetic gap and magnet assembly are reduced from 4 64 to 2 54 mm and from 2 4 to 1 5 kg, respectively

B76-10184
LOW-REFLECTIVITY SPECTRALLY SELECTIVE COATING
J J Zaniewski and H Herzig
Aug 1976
GSFC-12114 **Vol 1, No 2, p 193**

Mirror, with area of low reflectivity replaces neutral-density transmission filter in star-tracking system increasing reliability It may have applications in other optical systems

B76-10185
PULSE TRANSFORMER FOR GAAS LASER
E M Rutz (IBM)
Aug 1976
M-FS-23399 **Vol 1, No 2, p 194**

High-radiance gallium arsenide (GaAs) laser operating at room temperature is utilized in optical navigation system For efficient transformer-to-laser impedance match laser should be connected directly to pulse transformer secondary winding

B76-10186
SOLAR THERMAL ENERGY UTILIZATION A BIBLIOGRAPHY WITH ABSTRACTS
Innovator not given (New Mexico Univ) Aug 1976
HQN-10900 **Vol 1, No 2, p 195**

Bibliographic series, which is periodically updated cites documents published since 1957 relating to practical thermal utilization of solar energy Bibliography is indexed by author, corporate source, title, and keywords

B76-10187
OPTICS AND LASERS
Innovator not given Aug 1976 See also NASA-SP-5973(03)
HQN-10893 **Vol 1, No 2, p 195**

Report describes twenty-seven optical concepts developed for holographic viewing, spectral transmission, and film camera technology Articles include developments in laser-Doppler systems, laser beam deflection controls X-ray photography, and camera components

B76-10188
OPTICAL DEVICES
Innovator not given Aug 1976 See also NASA-SP-5965(01)
HQN-10891 **Vol 1, No 2, p 195**

Report describes thirty concepts and techniques developed for optical instrumentation and light transmission and generation including spectrometer components telescopes and microscopes and holographic cameras

B76-10189
HYDROGEN ENERGY A BIBLIOGRAPHY WITH ABSTRACTS
Innovator not given (New Mexico Univ) Aug 1976
HQN-10898 **Vol 1, No 2, p 196**

Bibliographic series cites documents relating to use of hydrogen as energy carrier In addition to cumulative volume annual supplement is available for 1974, and quarterly update program serves 1975 and current calendar year

B76-10190
SANDTRACKS WORLD MAP AND STATIONS PREDICTIONS COMPUTER PROGRAMS
R J Sandifer
Aug 1976
GSFC-12099 **Vol 1, No 2, p 196**

Computer program computes time history of subsatellite point and visibility from station to given satellite by integrating given epoch state

B76-10331
LASER PARTICULATE SPECTROMETER
B A Boyd (McDonnell-Douglas Corp) R M F Linford (McDonnell-Douglas Corp) and R J Schmitt (McDonnell-Douglas Corp)
Jan 1977 See also NASA-CR-144375 (N75-29407)
MSC-14969 **Vol 1, No 3, p 357**

Hybrid laser scattering and extinction technique measures particle diameters from 0 8 to 2 75 micrometers and speeds from 0 2 to 20 m/s Operating pressures range from ambient to ultra-high vacuum, and temperatures range from 77 to 300 K Potential applications include air pollution clean room, and particle size monitoring

B76-10332
ECONOMICAL MEASUREMENT OF PARTICLE CONCENTRATION
W R McCluney
Jan 1977
GSFC-12088 **Vol 1, No 3, p 358**

Meter utilizes three optical systems to detect light scattered by particles in hydrosol at 2 deg and 90 deg simultaneously Device has capability to detect relative amounts of organic and inorganic contaminants and, with proper calibration to measure contribution of various species to changes in contamination levels in liquid mediums

B76-10333
PINHOLE DIFFRACTION FILTER
B E Woodgate
Jan 1977
GSFC-12120 **Vol 1, No 3, p 359**

Multistage diffraction filter consisting of coalined series of pinholes on parallel sheets can be used as nondegradable UV filter Beam is attenuated as each pinhole diffracts radiation in controlled manner into divergent beam and following pinhole accepts only small part of that beam

B76-10334
A FORWARD-SCATTER POLARIMETER FOR CHEMICAL ANALYSIS
A L Fymat
Jan 1977
NPO-13756 **Vol 1, No 3, p 360**

Photopolarimeter measures two states of orthogonal polarization parallel and perpendicular to scattering plane defined by directions of incident and scattering light, to determine effective gaseous depolarization factor Instrument can be used for *environmental spectroscopic, and meteorological analysis*

B76-10335
STABILIZED ND YAG LASER OUTPUT
J Osmundson
Jan 1977
GSFC-11571 **Vol 1, No 3, p 361**

Stabilization system consists of feedback-loop-controlled

piezoelectric crystal to one of the reflectors to vary optical path length within laser cavity Average second harmonic of fundamental 1 06 *micrometer laser radiation is detected by integrating* detector

B76-10336
VACUUM-ULTRAVIOLET REFLECTOMETER
T H Allen (McDonnell-Douglas Corp), C F Dillow (McDonnell-Douglas Corp) and R M F Linford (McDonnell-Douglas Corp)
Jan 1977
MSC-14995 **Vol 1, No 3, p 362**

Baffle, three-blade chopper, and split spherical mirror transmit alternating dual beam into integrating sphere Alternating reference and sample beams are detected by high gain photomultiplier and modified logarithmic ratiometer Device is useful in fusion research, high power laser work and spectrometer or monochrom*ator construction*

B76-10337
EXTERNAL HEATER FOR CRYOGENIC VESSELS
G J Wennagel (Grumman Aerospace Corp)
Jan 1977
MSC-14056 **Vol 1, No 3, p 363**

When used in conjunction with nitrogen purge system, external heating film increases gas temperature, thereby preventing chilling of equipment Proposed system includes vacuum-deposited layer of gold sandwiched between two layers of Mylar which act as carrier for film and prevent damage

B76-10338
OPTICAL PROFILOMETER
E E Burcher W L Kelly, IV and S J Katzberg
Jan 1977
LANGLEY-11869 **Vol 1, No 3, p 364**

Device, consisting of optical scanning subsystem two light detectors with associated amplifiers analog divider, and adjustable nonlinear function generator, directly determines surface area absolute depth, and point-to-point distance of three-dimensional object without physical contact with surface under observation

B76-10339
SELF-CALIBRATING RADIOMETER
J Dimeff
Jan 1977
ARC-10811 **Vol 1, No 3, p 365**

Instrument has differential thermocouples that measure temperature on two sides of receiver, one side is heated by *absorbed radiation the other by resistance heater By measuring* energy required to heat back surface, amount of energy absorbed on front may be determined

B76-10340
TUNABLE ACOUSTICAL OPTICAL FILTER
A L Lane
Jan 1977
NPO-13640 **Vol 1, No 3, p 366**

Solid state filter with active crystal element increases sensitivity and resolution of passive and active spectrometers Filter is capable of ranging through infrared and visible spectra, can be built as portable device for field use, and is suitable for ecological surveying, for pollution detection and for pollutant classification

B76-10341
EFFICIENT COPPER-VAPOR PULSED LASER
G R Russell N M Nerheim, and T J Pivirotto
Jan 1977
NPO-13449 **Vol 1, No 3, p 367**

High velocity flow is attained within system by expanding heated mixture of copper vapor argon and helium through supersonic nozzle Arc heater, operated on argon/helium mixture, supplies energy to vaporize copper and to produce high temperature supersonic flow of gas/vapor mixture

B76-10342
MEASURING SCATTER ANGLE FROM MIRRORS
Innovator not given (Perkin-Elmer Corp) Jan 1977
M-FS-23421 **Vol 1, No 3, p 368**

Two instrumentation systems are used to measure scatter angle intensity scatterometer makes small angle measurements on order of 10 arc-minutes amplitude scatterometer which *uses interferometric principle measures smaller angles on order* of 10 arc-seconds Both scatterometers use laser sources and can measure into ultraviolet (0 325 micron) wavelengths

B76-10343
HOLOGRAM-RECONSTRUCTION SIGNAL ENHANCEMENT
R S Mezrich (RCA)
Jan 1977
M-FS-23104 **Vol 1, No 3, p 369**

Principle of heterodyne detection is used to combine object beam and reconstructed virtual image beam All light valves in page composer are opened and virtual-image beam is allowed to interfere with light from valves

B76-10344
MINIATURE CARBON DIOXIDE SENSOR
J Bordeaux (Beckman Instr , Inc) and B D Henderson (Beckman Instr , Inc)
Jan 1977 See also NASA-CR-144508 (N75-33375)
MSC-16009 **Vol 1, No 3, p 370**

Infrared absorption spectrometer with dual wave length monochromator has several valuable features 3 4 by 1 6 inch size, accuracy within plus or minus 5% from 0 to 30 mm Hg, instantaneous and temperature-independent response time, negligible O2 and N2 effects and less than 0 5% water vapor effect 2 5 W power consumption, no moving parts, and 1 5 and 30 mm Hg CO2 in range

B76-10345
MONITOR FOR OPTICAL-WINDOW CONTAMINATION
L N Harnett (TRW, Inc)
Jan 1977
ARC-10947 **Vol 1, No 3, p 371**

System uses window itself as principal element of well-known attenuated total reflection technique frequently used for spectroscopic analysis of thin films Monitor includes notch in monitored window, which acts as beam splitter to reflect portion of light at less than critical angle and causes total internal reflection

B76-10346
COLOR TO BLACK-AND-WHITE CONVERTER
W E Perry
Jan 1977
MSC-12618 **Vol 1, No 3, p 372**

Lanthanum-modified lead zirconate titanate ceramic plate, when sandwiched between pair of conventional light polarizers forms electrically controlled coverter for television camera Assembly can be used with camera at remote site to enable *camera to transmit color or black and white signal on command*

B76-10347
LOW-LIGHT-LEVEL INTEGRATING VIDEO SYSTEM
B J Duncan, T D Fay E R Miller, W Wamsteker R M Brown (Computer Sci Corp), and P L Neely (Computer Sci Corp)
Jan 1977
M-FS-23288° **Vol 1, No 3, p 373**

System consists of television camera using 25 mm SEC vidicon low dispersion spectrograph, and digital video image system used for buffer storage of video data during tube readout scanning Six-bit ADC converts video to digital data which are stored on magnetic tape for future evaluation

B76-10348
SHADOW MASK FOR X-RAY SPECTROMETER
B E Woodgate
Jan 1977
GSFC-12131 **Vol 1, No 3, p 374**

Imaging technique may be used in series with flat or conical Bragg crystals to separate spatial/spectral convolution when spectrometer is scanned across extended source emitting at

more than one wavelength .Technique allows line direction and continuum to be detected and provides data for spatial mapping of source

B76-10349
QUARTZ-CRYSTAL-OSCILLATOR HYGROMETER
R Kruger
Jan 1977
GSFC-12153 **Vol 1, No 3, p 375**

Measuring device, which eliminates complex and expensive optical components by electronically sensing dewpoint of water vapor in gas, employs piezoelectric crystal oscillator, supportive circuitry, temperature regulators, and readout

B76-10350
TERRESTRIAL PHOTOVOLTAIC MEASUREMENTS WORKSHOP
Innovator not given Jan 1977 See also NASA-TM-X-71802 (N76-71615)
LEWIS-12643 **Vol 1, No 3, p 375**

Workshop proceedings review basic methodology for measurements and calibration of solar cells Also included are decisions concerning interim method for terrestrial solar cell measurements in order that results may be correlated between organizations doing solar cell research

B76-10351
WING CALCULATING LIGHTNING-INDUCED VOLTAGES IN ELECTRICAL CIRCUITS WITHIN AN AIRCRAFT WING
J A Plumer (GE)
Jan 1977
LEWIS-12108 **Vol 1, No 3, p 376**

Computer program based on Biot-Savart and Faraday laws utilizes model of generalized aircraft wing to calculate resistive and inductive transfer impedances relating lightning current flowing through wing to voltage induced in conductor within wing

B76-10485
ENERGY CONVERSION SYSTEM
C G Miller
Mar 1977 See also B75-10314
NPO-13510 **Vol 1, No 4, p 541**

Scheme based on chemical decomposition and recombination converts energy collected at relatively low temperatures (300 C) to higher temperatures required for efficient operation of steam-driven electrical generators Approach uses one or more cyclical reversible chemical reactions in which compound is made to decompose and absorb thermal energy at low temperature by shifting equilibrium

B76-10486
IMPROVED SOLAR-ENERGY COLLECTOR
M K Selcuk
Mar 1977
NPO-13813 **Vol 1, No 4, p 542**

Fixed, but reversible, concentrator with vacuum tube receiver is fabricated from individual asymmetrical vee-shaped members having two sides, each of which presents different preselected slope angle to sun Trough concentrator maintains year-round concentration factor of 2 (or better) for most significant collection period of day

B76-10487
ELECTROSTATIC-DISCHARGE IGNITION
J B Stephens and C G Miller
Mar 1977
NPO-13798 **Vol 1, No 4, p 543**

Electrode in cylinder permits charge to transfer during top dead center compression stroke in modified Otto-cycle engine Charge transfer produces spark which causes ignition of droplets without resorting to other ignition devices which are incapable of igniting ultralean mixtures

B76-10488
HYDROFOIL CONTROLS OUTFALL EFFLUENTS IN RIVERS AND OCEANS
R C Costen
Mar 1977
LANGLEY-12045 **Vol 1, No 4, p 545**

System, which consists of vertical semispan hydrofoil anchored in water bed and set at angle of attack with respect to ambient water flow, works by keeping pollutants concentrated within long trailing vortex generated by hydrofoil and either deflecting vortex away from sensitive regions or sweeping it from side to side for rapid dispersion

B76-10489
PORTABLE, WIND SENSITIVE, DIRECTIONAL AIR SAMPLER
J N Deyo, R B King, and J Toma
Mar 1977 See also NASA-TM-X-71687 (N75-19623)
LEWIS-12743 **Vol 1, No 4, p 546**

Air Scout unit has preset timer that controls length of time filter slides are in sampling position At end of sampling period, fresh slide is automatically moved into position and exposed filter is displaced into storage compartment Device may be set up, loaded, programmed and left to acquire samples automatically

B76-10490
REMOTE SENSING OF VEGETATION AND SOIL
J B Schutt and S O Auer (NAS)
Mar 1977
GSFC-11976 **Vol 1, No 4, p 547**

Microwave ellipsometry apparatus reflects circularly polarized train of microwaves from vegetation at predetermined angle of incidence to determine ratio of intensities of electric field components and their phase differences Refractive index given by water content of vegetation and thickness of vegetation layer are computed from formula based on Maxwell s equations

B76-10491
PORTABLE SOLAR RADIOMETER MEASURES STACK-PLUME EFFLUENTS
R J Exton and R W Gregory
Mar 1977 See also NASA-TN-D-8182 (N76-26718)
LANGLEY-12123 **Vol 1, No 4, p 548**

Radiometer features two optical arrangements easy-to-aline pointing optical system that is boresighted to second radiometric optical system which utilizes four filters to select wavelengths Four channel device uses Sun as background source and measures attenuation of solar radiation through plume

B76-10492
REMOTE MOISTURE-CONTENT BALANCE
R A Blomseth, H Lum Jr , and Y Matsumoto
Mar 1977
ARC-11032 **Vol 1, No 4, p 549**

Automatic balance monitors wetness of wood samples to determine forest fire hazards Fuel model consists of four wooden dowels that will absorb precipitation moisture and humidity at rate related to moisture absorption by forest wood Model wetness is determined from weight changes as monitored by electronic balance

B76-10493
DATA SYSTEM FOR MULTIPLEXED WATER-CURRENT METERS
C R Ramsey (GE)
Mar 1977
M-FS-23343 **Vol 1, No 4, p 550**

Flow rates at 32 flood plain locations are measured simultaneously by single digital logic unit with high noise immunity Water flowing through pygmy current meters rotates element that closes electrical contact once every resolution, so flow rate is measured by counting number of closures in time interval

B76-10494
DIFFERENTIAL-OPTOACOUSTIC ABSORPTION DETECTOR
M S Shumate
Mar 1977
NPO-13759 **Vol 1, No 4, p 552**

Two-cell spectrophone detects trace amounts of atmospheric pollutants by measuring absorption coefficients of gases with various laser sources Device measures pressure difference between two tapered cells with differential manometer Background signal is reduced by balanced window heating and balanced carrier gas absorption in two cells

B76-10495
IMAGE INTENSIFICATION OF DEVELOPED PHOTOGRAPHS
B S Askins
Mar 1977
M-FS-23461 **Vol 1, No 4, p 553**

Autographic technique intensifies image on developed film using organic sulfur compound Organic sulfur compound combines with silver on original film Beta emission of compound exposes new film Technique is less time consuming and safer than existing methods

B76-10496
SOLVENT FOR 1-PHENYL-3-PYRAZOLIDONE IN PHOTOGRAPHY
A R Shulman, R Shaffer (Computer Sci -Technicolor Associates), and E L Shulman
Mar 1977
GSFC-11992 **Vol 1, No 4, p. 553**

Dimethyl sulfoxide is shown to be capable of disolving silver halide developers

B76-10497
DC DRIVE SYSTEM FOR CINE/PULSE CAMERAS
R H Gerlach, J T Sharpsteen (Perkin-Elmer Corp), C D Solheim (Perkin-Elmer Corp), and L J Stoap (Perkin-Elmer Corp)
Mar 1977 See also NASA-CR-147535 (N76-22510), NASA-CR-147759 (N76-25538)
MSC-16085 **Vol 1, No 4, p 554**

Camera-drive functions are separated mechanically into two groups which are driven by two separate dc brushless motors First motor, a 90 deg stepper, drives rotating shutter, second electronically commutated motor drives claw and film transport Shutter is made of one piece but has two openings for slow and fast exposures

B76-10498
ELIMINATION OF COLOR RINGS ON FILM NEGATIVES
C M Fleetwood, Jr , S H Rice, and R S Spencer
Mar 1977
GSFC-12110 **Vol 1, No 4, p 555**

Abrasive grinding of glass surface, using grinding-grit size of 22 5 micron, prevents formation of interference ring during photoprocessing To polish irregularities for improved light transmission, contact surface is bathed in aqueous solution of sulfuric acid and hydrofluoric acid

B76-10499
HIGH-RESOLUTION ELECTRON MICROSCOPE
R Nathan
Mar 1977
NPO-13811 **Vol 1, No 4, p 556**

Employing scanning transmission electron microscope as interferometer, relative phases of diffraction maximums can be determined by analysis of dark field images Synthetic aperture technique and Fourier-transform computer processing of amplitude and phase information provide high resolution images at approximately one angstrom

B76-10500
SPATIALLY-COHERENT COUPLED SEMICONDUCTOR LASERS
E M Rutz (IBM)
Mar 1977
M-FS-23396 **Vol 1, No 4, p 557**

External cavity for monolithic array of three GaAs lasers phase-coherently couples individual outputs to produce single spatially coherent beam Fourier-transform properties of lens and spatial filter are used to select coherent mode

B76-10501
SPATIAL FILTER FOR Q-SWITCHED LASER
L O Heflinger (TRW, Inc) and R F Wuerker (TRW, Inc)
Mar 1977 See also NASA-CR-121264 (N74-18152)
LEWIS-12164 **Vol 1, No 4, p 558**

Set of compound lenses reduces ionization and sparks that frequently occur around pinhole aperture in spatial filter Lens system produces astigmatic focus near pinhole, reducing energy level there below ionization theshold

B76-10502
SERVO CORRECTS INTERFEROMETER-MIRROR TILT
R A Schindler
Mar 1977
NPO-13687 **Vol 1, No 4, p 559**

Three detectors sense He-Ne laser beam, one senses reference phase while others, at right angles to first, sense phase offset for each axis Analog output of axis detectors is multiplied separately by reference output to give X and Y error signals that are then fed to respective X and Y actuators

B76-10503
TEMPERATURE REFERENCE FOR MICROWAVE RADIOMETER CALIBRATION
A W Love (Rockwell Intern Corp), M J Vanmelle (Rockwell Intern Corp), A C Jones (Rockwell Intern Corp), and W N Hardy (Rockwell Intern Corp)
Mar 1977
LANGLEY-11355 **Vol 1, No 4, p 561**

New temperature reference avoids need to physically remove antenna and replace it with calibrating termination Device is piece of porous microwave absorber fitted with cap of nonporous plastic foam Absorbent material is soaked with cryogen Procedure ensures that temperature at which microwaves are absorbed is exactly that of cryogen

B76-10504
X-RAY SENSITIVE OBLIQUE IMAGING DEVICE
K L Hallam and C B Johnson (Bendix Corp)
Mar 1977 See also B73-10255
GSFC-11935 **Vol 1, No 4, p 562**

Instrument employs light reflecting surface (evaporated aluminum coating or minor substrate) behind phosphor screen to improve effective quantum efficiency in dual process fraction of incoming X-rays are converted to photoelectrons at photocathode, and X-rays that pass through photocathode and thin X-ray transparent membrane enter phosphor screen

B76-10505
DUAL-PURPOSE HOLOCAMERA
L O Heflinger (TRW, Inc) and R F Wuerker (TRW, Inc)
Mar 1977 See also NASA-CR-121264 (N74-18152)
LEWIS-12166 **Vol 1, No 4, p 563**

Camera utilizes same basic structure to record bright-field holograms (single and double exposure interferograms) or, with minor adjustments, record forward scattered light holograms Components that must be interchanged to convert camera can be mounted on sliding plate

B76-10506
MAGNIFYING IMAGE INTENSIFIER
J Vine (Westinghouse Elec Corp)
Mar 1977
GSFC-12010 **Vol 1, No. 4, p 564**

Coil assembly for zoom operation produces axial magnetic flux density that decreases in strength from photocathode to target This results in magnification factor greater than unity To extend magnification range, field is reversed in direction between object and image planes

B76-10507
DEVELOPMENT EPHEMERIS NUMBER 96
M S W Keesey, X X Newhall, and E M Standish, Jr
Mar 1977
NPO-14002 **Vol 1, No 4, p 565**

Program tape contains two files file one contains all software

necessary to create binary file and perform ephemeris calculation on that file, file two of distributed tape contains encoded ephemeris data These data are essentially a blocked listing of complete dump of original binary tape with double precision data modified to special form

B76-10508
MULTISPECTRAL-SCANNER IMAGE PROCESSING
M I Stein
Mar 1977
GSFC-12135 **Vol 1, No 4, p 566**

QUIKLOOK program performs approximate geometric and radiometric corrections of LANDSAT multispectral-scanner digital data and calculates Earth rotation (skew) correction from format center latitude as given by annotation record of LANDSAT bulk computer-compatible tapes

B76-10509
MULTIDIMENSIONAL HEAT CONDUCTION
T C Connors, Jr (Rockwell Intern Corp) and L W Fesler (Rockwell Intern Corp)
Mar 1971
MSC-16159 **Vol 1, No 4, p 566**

Computer program computes transient temperature history or steady state solution for complex body geometries in three geometries Program allows option of four methods of solution forward difference method, midpoint difference (Crank-Nicholson) method, backward difference method, and alternating direction technique

B76-10510
GEODETIC CONTROL NET
M E Davies (Rand Corp)
Mar 1977
NPO-13718 **Vol 1, No 4, p 566**

Computer program, originally developed for Mariner flyby missions, computes planetary control net from measurements of topographical features identified on television pictures Program solves for areocentric coordinates of 115 surface points and orthogonal camera matrices of 57 far and near encounter pictures

B76-10511
ANALYSIS OF LASER HETERODYNE COMMUNICATIONS
S Cohen, S H Brewer (Hughes Res Labs), and T A Nussmeier (Hughes Res Labs)
Mar 1977
GSFC-12098 **Vol 1, No 4, p 567**

Computer program, which predicts effects of optical aberrations on transmitters and receivers, includes effects of Gaussian pupil functions and utilizes algorithm that permits specification of number and location of output points for computed spread function results

B76-10512
ACTIVE OPTICS SIMULATION SYSTEM
Innovator not given (Perkin-Elmer Corp) Mar 1977
LANGLEY-12104 **Vol 1, No 4, p 567**

Set of three major computer program packages aids design of mirror control system for large telescopes It can be used to evaluate merit of particular active optics control system (or component subsystem), and once system configuration is chosen, it can be used as design aid to optimize system parameters

B76-10513
DIGITAL IMAGE-RECTIFICATION SYSTEM
P H VanWie, M I Stein, E Puccinelli, and B Fields
Mar 1977
GSFC-12156 **Vol 1, No 4, p 568**

System removes spatial distortions from data and brings data into conformance with Universal Transverse Mercator map projection, produces digital output products suitable for further machine processing and analysis, and fills need for geometrically corrected LANDSAT multispectral scanner digital data in several remote sensing application areas

04 MATERIALS

B76-10058 **Vol 1, No. 1, p 57**
NOVEL AMINOBENZYL AND IMIDOBENZYL BENZENES
V L Bell, J R Pratt (Southern Mississippi Univ), and B L Stump (Virginia Commonwealth Univ)
Mar 1976
LANGLEY-11843

Compounds are useful as intermediates for several classes of polymers Amines can function as cross-linking agents for epoxide and urethane polymers, as well as intermediates for synthesis of thermally-stable addition-type polyimides Imide derivatives can be obtained by reacting amines with certain monoanhydrides containing olefinic unsaturation

B76-10059
ATMOSPHERIC PARTICLE SAMPLER
C G Miller and J B Stephens
Mar 1976
NPO-13396 **Vol 1, No 1, p 68**

Positive and/or negative pressure is used to trap airborne particles against a filter Positive pressure is provided by low molecular weight gas (He or H) to achieve high particle velocity and high capture percentage Trapped particles are examined under electron microscope

B76-10060
CONTINUOUS HCL IN AIR INDICATOR
R E Bartera and C G Miller
Mar 1976
NPO-13474 **Vol 1, No 1, p 69**

Steady stream of air is drawn into system and passes between light source and photocell Incoming gases are sprayed with ammonia forming white cloud of NH4Cl if any HCl is present

B76-10061
THERMAL FATIGUE-AND-OXIDATION-RESISTANT ALLOY
P T Bizon, W J Waters, and D A Spera
Mar 1976 See also B76-10062, NASA-TN-D-3597 (N66-34938), NASA-TN-D-8071 (N75-33429)
LEWIS-12564 **Vol 1, No 1, p 70**

Cast nickel-base alloy designated as NASA TAZ-8A has been developed for use in high temperature aircraft engine components TAZ-8A composition is 8Ta, 6Cr, 6Al, 4Mo, 4W, 2Cb 0 5Zr, 0 125C, 0 004B and balance Ni (weight percent) Its specific gravity at room temperature is 8 65

B76-10062
COMPARATIVE THERMAL FATIGUE RESISTANCE
P T Bizon and D A Spera
Mar 1976 See also B76-10061, NASA-TN-D-8071 (N75-33429)
LEWIS-12563 **Vol 1, No 1, p 71**

Nineteen cast nickel-base alloys five cast cobalt-base alloys, and two wrought nickel-base alloys are included in study Five nickel-base alloys have directionally-solidified polycrystalline grain structure Three diffusion coatings and vapor-deposited overlay coating are also included in investigation

B76-10063
HYDROGEN CHLORIDE TEST SET
G L Workman (Athens Coll)
Mar 1976
M-FS-23357 **Vol 1, No 1, p 73**

Detector uses tertiary amine, which makes reaction fairly specific for relatively small highly polarized hydrogen chloride molecule Reaction is monitored by any microbalance capable of measuring extremely small mass differences in real time

B76-10064
THERMAL INSULATION FOR HIGH-TEMPERATURE SYSTEMS
A J Parker (Hittman Associates, Inc)

Mar 1976
GSFC-10954 **Vol 1, No 1, p 74**
Forty layers of 0 00064 cm platinum foil sprayed with zirconium during assembly, comprise laminated insulation with microquartz felt set into corners

B76-10065
POLYMERIC FOAMS STABLE AT HIGH TEMPERATURES
S R Riccitiello, E S Harrison (Whittaker Corp), and C B Delano (Whittaker Corp)
Mar 1976
ARC-11008 **Vol 1, No 1, p 75**
Crosslinked poly(N-arylenebenzimidazoles) are stable up to 370 C Polymers are made by mixing appropriate stoichiometric amounts of tetramine and aromatic dicarboxylic acid anhydride with phenol or alkyl-substituted phenol

B76-10066
TRANSPARENT AND FLAME-RETARDANT POTTING COMPOUNDS
S L Lieberman (Furane Plastics, Inc)
Mar 1976 See also NASA-CR-134234 (N74-21159), NASA-CR-134235 (N74-21160), NASA-CR-134236 (N74-21161), NASA-CR-134237 (N74-21162)
MSC-14669 **Vol 1, No 1, p 76**
Potting compounds include series of modified silicone RTV polymers and series of coreacted epoxy urethanes Special properties are obtained by including Br, P, and N in polymeric structure

B76-10067
COATINGS FOR MULLITE INSULATION
P N Bolinger (GE) and H W Rauch, Sr (GE)
Mar 1976
LANGLEY-11150 **Vol 1, No. 1, p 76**
Series of coatings provides hard, impermeable, waterproof layer Inclusion of color oxides imparts high emittance to surface Refractory fillers investigated include TiO2, BaO ZrO2, SrO TiO2 zircon, spodumene, petalite, and kryptonite Colorants include Cr2O3, NiO, and CoO

B76-10068
SPECIFIC-ION ELECTRODES FOR MEASURING AG IONS
J L Day and J M Walsh (Beckman Instr, Inc)
Mar 1976
MSC-14906 **Vol 1, No 1, p 77**
Migration of aqueous solutions through electrode pellet, and thus corrosion of soldered connection, is prevented by coating pellet and silver wire attachment with silver-conductive epoxy

B76-10069
REDUCTION OF ACOUSTIC LOSSES BY OUTGASSING
E H Cirlin (Rockwell Intern Corp), R M Housley (Rockwell Intern Corp), and B R Tittmann (Rockwell Intern Corp)
Mar 1976
MSC-15985 **Vol 1, No. 1, p 77**
Heat treatment procedure at low pressure increases internal-friction quality factor of treated samples Method can reduce propagation losses in porous ferroelectric ceramics by as much as a factor of 100

B76-10070
REDOX - ELECTROCHEMICAL ENERGY STORAGE
M Warshay, L O Wright, and L A Thaller
Mar 1976 See also NASA-TM-X-71540 (N74-21688), NASA-TM-X-71805 (N75-32593)
LEWIS-12220 **Vol 1, No 1, p 78**
Rechargeable system, which operates at relatively low temperatures from room temperature to about 353 K, consists of analyte and catholyte storage tanks connected to flow cell

B76-10071
PASSIVE THERMAL-CONTROL COATINGS
T K Mookherji (Teledyne Brown Eng) and J D Hayes (Teledyne Brown Eng)
Mar 1976
M-FS-22794 **Vol 1, No 1, p 79**
Design engineers handbook discusses passive temperature control techniques selection of control surfaces and environmental damage mechanisms

B76-10072
HANDBOOK OF LIQUID METALS
A O Ukanwa (Howard Univ)
Mar 1976
M-FS-23355 **Vol 1, No 1, p 79**
Metals are described by physical appearance followed by atomic weight, atomic number, and valence Data include laboratory handling and safety procedures, heat transfer correlations, diffusion coefficients in liquid gallium/indium solution melting and boiling points, thermal conductivity, heat capacity, and electrical resistivity

B76-10191
CHEMILUMINESCENT PREDICTION OF SERVICE LIFE
J A Hassell (Battelle Mem Inst), G D Mendenhall (Battelle Mem Inst), and R A Nathan (Battelle Mem Inst)
Aug 1976 See also NASA-CR-147463 (N76-18276)
MSC-16010 **Vol. 1, No 2, p 199**
Technique can be used to predict polymer degradation under actual expected-use conditions, without imposing artificial conditions Smooth or linear correlations are obtained between chemiluminescence and physical properties of purified polymer gums

B76-10192
THERMOLUMINESCENCE FOR FORENSIC ANALYSIS
D D Lawson
Aug 1976 See also B76-10193
NPO-11607 **Vol 1, No 2, p 200**
Apparatus is used to determine commonality of origin of physical evidence

B76-10193
LOW-TEMPERATURE THERMOLUMINESCENCE
D D Lawson and J D Ingham
Aug 1976 See also B76-10192
NPO-11935 **Vol 1, No 2, p 202**
Technique for determining commonality of origin of materials is applicable to materials which are not solids at room temperature and heat-sensitive materials Contamination of sample is avoided by using sealed sample cup Technique is useful for determining origins of oil pollutants and has potential in mapping of lakes and/or oceans

B76-10194
SOLVENTLESS INTUMESCENT COATINGS
S Schwartz (Hughes Aircraft Co)
Aug 1976 See also NASA-CR-137706 (N75-28228)
ARC-10996 **Vol 1, No 2, p 203**
Composition, requiring no hydrocarbon solvent, can be applied in smooth layers and molded or pressed into variety of shapes

B76-10195
THERMAL/ACOUSTICAL INSULATION FOAM
R Y Lin (Carborundum Co) and E A Struzik (Carborundum Co)
Aug 1976 See also NASA-CR-141498 (N75-15803)
MSC-14795 **Vol 1, No 2, p 204**
Lightweight low-density substance can be used as fire resistant insulation in aircraft Material density can be controlled over range from 0 6-1 2 pounds per cubic foot and has good thermal and acoustic properties

B76-10196
COATING FOR SOLAR PANELS
R W Gumbs (R Gumbs Assoc)
Aug 1976
M-FS-23420 **Vol 1, No 2, p 205**
Inexpensive composition with high energy-absorptivity and low emissivity requires no primers for adhesion to aluminum,

copper, and stainless steel and uses commercially available materials

B76-10197
IMPROVED INSULATION MATERIAL
Innovator not given (Beech Aircraft Corp) Aug 1976
MSC-14642 **Vol 1, No 2, p 205**
Multilayer material consisting of embossed, silver-coated Mylar, Nylon net, and silk net is useful for thermal-protection systems and cryogenic containers Embossing serves two purposes helps separate radiation barriers and controls radiant energy diffusion Insulation requires no maintenance after installation

B76-10198
AUTOMATED SOLVENT CONCENTRATOR
J S Griffith and J L Stuart
Aug 1976 See Also B76-10199 B76-10200
NPO-13068 **Vol 1, No 2, p 206**
Designed for automated drug identification system (AUDRI) device increases concentration by 100 Sample is first filtered removing particulate contaminants and reducing water content of sample Sample is extracted from filtered residue by specific solvent Concentrator provides input material to analysis subsystem

B76-10199
PRECOLUMN FOR EXTRACT CONCENTRATION
V J Jahnsen and W G Bloom
Aug 1976 See also B76-10198, B76-10200
NPO-13083 **Vol 1, No 2, p 207**
AUDRI requires test sample separation into organic compound families for subsequent insertion into several parallel chromatographs Sample is first extracted by selective organic solvents Solvent is then removed from extract to increase extract-to-solvent ratio increasing system sensitivity Backflushing of precolumn serves as cleanser

B76-10200
FRACTION-STORAGE UNIT FOR DRUG-IDENTIFICATION SYSTEM
C F Campen and J L Stuart
Aug 1976 See also B76-10198 B76-10199
NPO-13111 **Vol 1, No 2, p 208**
Device, connecting outputs of all gas chromatographs to single, relatively inexpensive IR spectrometer reduces costs of system Storage unit provides buffer storage of samples until infrared spectrometer is ready to accept them Storage unit can be used to separate overlapping peaks

B76-10201
ABRASION-RESISTANT COATINGS FOR PLASTIC SURFACES
T J Wydeven and J R Hollahan (Tegal Corp)
Aug 1976 See also B73-10507
ARC-10915 **Vol 1, No 2, p 210**
Optically clear composition of organosilicon compounds insulates plastic surfaces and protects them from abrasion Plasma polymerization process produces superior uniformity and clarity than previous coating techniques

B76-10202
GROWING CRYSTALS FROM EUTECTIC MELTS
B N Bhat (Natl Res Council)
Aug 1976
M-FS-22926 **Vol 1, No 2, p 210**
Inverted Bridgman Method yields crystals of higher homogeneity and better structure than those grown by ordinary Bridgman method Process controls thermotransport by holding molten alloy in known temperature for known period of time Rapid cooling quenches in state of segregation Method is applicable to other eutectiferous systems where thermotransport is appreciable

B76-10203
COMPRESSED AIR CYLINDER PALLET
K G Highley (Rockwell Intern Corp)
Aug 1976
MSC-19217 **Vol 1, No 2, p 211**
Device simultaneously handles up to twenty standard size, compressed air cylinders with improved safety

B76-10204
PYROIONIC INFRARED DETECTOR
A Sher (William and Mary Coll)
Aug 1976
LANGLEY-11921 **Vol 1, No 2, p 212**
Device functions near room temperature and is not sensitive to vibrations

B76-10205
SEPARATION OF WATER FROM AIR SAMPLES
B J Tyson and G C Carle
Aug 1976
ARC-10890 **Vol 1, No 2, p 213**
Gas chromatograph with sorbitol column, used in a three-part system separates collected water from preconcentrated air samples

B76-10206
VAPOR CORROSION INHIBITORS
L A Bielman (Rockwell Intern Corp)
Aug 1976
M-FS-19232 **Vol 1, No 2, p 213**
Report describes effectiveness and materials compatibility of amine nitrites Particularly of value to those interested in long-term corrosion protection

B76-10352
FRACTION COLLECTOR FOR ELECTROPHORESIS
M Bier (Veterans Admin Hosp, Tucson, Ariz)
Jan 1977
M-FS-23459 **Vol 1, No 3, p 379**
Rotating-tube electrophoresis apparatus employs rotating jet of eluting buffer to reduce effects of convection during separation Designed for separation of microorganisms and biological species system combines gravity/gradient compensating of lumen with buffer flush at fraction outlet to increase separation efficiency

B76-10353
MOLECULAR BEAM GENERATOR
R G Richmond T H Allen (McDonnell-Douglas Corp), R M F Linford (McDonnell-Douglas Corp), and J E Wittman (McDonnell-Douglas Corp)
Jan 1977 See also NASA-CR-144376 (N75-29135)
MSC-14996 **Vol 1, No 3, p 380**
Vacuum deposition generator has nozzle and aperture designed especially for beams of heavy organic molecules Deposition rates are from 6 to 15 angstroms per minute

B76-10354
CATALYTIC OXIDATION OF WASTE MATERIALS
R B Jagow (Lockheed Missiles and Space Co)
Jan 1977
MSC-14831 **Vol 1, No 3, p 381**
Aqueous stream of human waste is mixed with soluble ruthenium salts and is introduced into reactor at temperature where ruthenium black catalyst forms on internal surfaces of reactor This provides catalytically active surface to convert oxidizable wastes into breakdown products such as water and carbon dioxide

B76-10355
COMPOSITE LAMINATE WARPAGE
C C Chamis
Jan 1977 See also NASA-TM-X-71619 (N75-11048)
LEWIS-12615 **Vol 1, No 3, p 382**
Set of simplified equations predicts warpage that often occurs upon removal from fabrication mold Equations predict corner deflection and are based upon micromechanics and macromechanics of composites, as well as laminate theory Factors considered

include ply misorientation fiber migration, and void/volume ratio nonuniformity

B76-10356
DETERMINATION OF TRACE AMOUNTS OF POF3
J N Foster (Rockwell Intern Corp)
Jan 1977
LEWIS-10577 **Vol 1, No 3, p 383**

Approach takes advantage of fact that phosphorous oxyfluoride (POF3) and phosphorous oxychloride (POC13) both belong to same molecular symmetry group and should have extinction coefficients that are approximately the same Extinction coefficient of reagent-grade POC13 is measured and this coefficient is employed to calculate POF3 concentrations

B76-10357
FLAME-RESISTANT ELASTOMERIC POLYMERS
J T Howarth (Little/Arthur D /, Inc) S G Sheth (Little/Arthur D /, Inc) and K R Sidman (Little/Arthur D /, Inc)
Jan 1977 See also NASA-CR-144362 (N75-29264)
MSC-16078 **Vol 1, No 3, p 384**

Family of polymer formulations, which has limiting oxygen indices from 50 to 100, can be extruded through dies to produce elastic fibers compression molded, dissolved in solvents as required for coatings, and calendered to produce film and embossed sheeting Applications include upholstery, paint products, automobile products, and coated fabrics

B76-10358
ENAMEL FOR HIGH-TEMPERATURE SUPERALLOYS
H Levin (Hughes Aircraft Co) and W E Lent (Hughes Aircraft Co)
Jan 1977
M-FS-22804 **Vol 1, No 3, p 385**

Desired optical and high temperature enamel properties are obtained with glasses prepared from the system Li2O-ZrO2-nSiO2 Molar compositions range from n=4 to n=13, to which are added minor amounts in varying combinations of alumina, alkali fluorides boric oxide, alkali oxides, and alkaline earth oxides

B76-10359
SECOND-GENERATION PMR POLYIMIDES
T T Serafini, R D Vannucci and W B Alston (USAAMRDL)
Jan 1977 See also NASA TM-X-67803 (N71-23367), NASA-TM-X-71616 (N74-34960) NASA-TM-X-71816 (N76-11289), NASA-TM-X-71894 (N76-21337), NASA-TN-D-6877 (N72-29598)
LEWIS-12738 **Vol 1, No 3, p 386**

Continuing research has resulted in development of polyimides with improved thermo-oxidative stability at 589 K Polyimides are based on dimethyl ester of 4 4'-(hexafluoro-isopropylidene)-bis (phthalic acid) (HFDE) and p-phenylenediamine (PPDA) and NE

B76-10360
PURITY TEST FOR COPPER-PLATING SOLUTIONS
F B Mansfeld (Rockwell Intern Corp)
Jan 1977
M-FS-19298 **Vol 1, No 3, p 387**

Electrode configuration can be used to measure extent of impurities in acid-copper plating solution It can be inserted into any plating tank and will show whether bath is clean or contaminated, within fifteen minutes

B76-10361
EXPERIMENTAL DATA FOR NEW FIRE-RETARDANT MATERIALS
D E Supkis
Jan 1977 See also NASA-TM-X-58165 (N76-13040)
MSC-16022 **Vol 1, No 3, p 388**

Report contains evaluations of flammability and physical properties of twenty-four upholstery and furnishing materials, such as those used in commercial aircraft Data presented include degradation upon heating, limited oxygen indices, smoke generation, flammability afterglow, and char length

B76-10514
EXTRACTING LIGNINS FROM MILL WASTES
M F Humphrey
Mar 1977
NPO-13847 **Vol 1, No 4, p 571**

Addition of quaternary ammonium compound and activated charcoal to pulp and mill wastes precipitates lignins in sludge mixture Methanol dissolves lignins for separation from resulting slurry Mineral acid reprecipitates lignins in filtered solution Quaternary ammonium compound, activated charcoal as well as water may be recovered and recycled from this process

B76-10515
EXTRACTION OF UREA AND AMMONIUM ION
R T Anselmi (Martin Marietta Corp) R R Husted (Martin Marietta Corp), and J R Schulz (Martin Marietta Corp)
Mar 1977 See also NASA-CR-137596 (N75-13537)
ARC-11064 **Vol 1, No 4, p 572**

Water purification system keeps urea and ammonium ion concentration below toxic limits in recirculated water of closed loop aquatic habitat Urea is first converted to ammonium ions and carbon dioxide by enzygmatic action Ammonium ions are removed by ion exchange Bioburden is controlled by filtration through 0 45 micron millipore filters

B76-10516
LESS-COSTLY ACTIVATED CARBON FOR SEWAGE TREATMENT
J D Ingham, J J Kalvinskas, and W A Mueller
Mar 1977
NPO-13877 **Vol 1, No 4, p 573**

Lignite-aided sewage treatment is based on absorption of dissolved pollutants by activated carbon Settling sludge is removed and dried into cakes that are pyrolyzed with lignites to yield activated carbon Lignite is less expensive than activated carbon previously used to supplement pyrolysis yield

B76-10517
SURFACTANT-ASSISTED COAL LIQUEFACTION
G C Hsu
Mar 1977
NPO-13904 **Vol 1, No 4, p 574**

Improved process of coal liquefaction utilizing nonaqueous surfactant has increased oil yield from 50 to about 80% Asphaltene molecule formation of colloid particles is prevented by surfactant Separated molecules present more surface area for hydrogenation reaction Lower requirements for temperature pressure and hydrogen lead to reduction in capital and operation costs

B76-10518
MEMBRANE HAS HIGH UREA-REJECTION PROPERTIES
C C Johnson and T J Wydeven
Mar 1977
ARC-10980 **Vol 1, No 4, p 575**

Membranes are synthesized from ethylene and nitrogen in RF plasma at low power, gas-flow rates, and pressure Ethylene and nitrogen are used because flow rate and partial pressure of each gas can be independently controlled to produce optimum conditions for synthesizing membrane Membrane is particularly useful in recycling and purifying water

B76-10519
CATALYSTS FOR LOW-ENERGY ALDEHYDE PROCESSES
A Gupta, A Rembaum, C Frazier (Caltech), and H B Gray (Caltech)
Mar 1977
NPO-13827 **Vol 1, No 4, p 576**

Photochemical reaction of dicobalt octacarbonyl with polymeric support systems results in formation of polymer bonded metal catalyst Catalyst is used in hydroformylation (addition of carbon dioxide and hydrogen) of olefins to yield aldehydes

B76-10520
DETERMINING EUTECTIC COMPOSITION IN METAL ALLOYS

R L Ashbrook and Y G Kim (Intern Nickel Co)
Mar 1977 See also NASA-TM-X-71765 (N75-29243)
LEWIS-12633 **Vol 1, No 4, p 577**

Tube crucible and furnace are used to separate eutectic mixture from trial-melt ingot As ingot is slowly heated to melting point initial surface meeting will be eutectic mixture Molten metal is collected at bottom of crucible, where it is solidified

B76-10521
DETERMINING TOTAL CARBON IN HYDRAZINE
E E Davis (Bendix Corp)
Mar 1977
KSC-11022 **Vol 1, No 4, p 578**

Procedure incorporates modified pyrolysis train Samples are vaporized before entering furnace to be pyrolyzed at 850 C + or - 25 C Direct collection of pyrolyzed gas reduces loss of carbon dioxide Infrared spectroscopy can be used to analyze samples for carbon dioxide content

B76-10522
NEW DIAMINE HARDENERS FOR EPOXIES
V L Bell and T L StClair
Mar 1977 See also NASA-CR-145022 (N76-28424)
LANGLEY-11823 **Vol 1, No 4, p 579**

Stronger amine-cured polyepoxides can be obtained by using those diaminobenzophenones and diaminodiphenylmethanes that have amine groups located at ortho or meta positions to carbonyl or methylene groups joining two benzene rings

B76-10523
ELECTROLYTE CELLS MEASURE OXYGEN FUGACITIES
R J Williams and O Mullins (Lockheed Electronics Co)
Mar 1977 See also NASA-TM-X-58167 (N76-18246)
MSC-16089 **Vol 1, No 4, p 580**

System that uses calcia-stabilized zirconia-ceramic electrolyte in oxygen concentration cell can directly measure oxygen fugacity in vertical-quench furnace, redox-control system System can independently vary temperature and oxygen fugacity during experiments and can record these parameters as function of time

B76-10524
NUCLEATION OF ELECTRONIC-CRYSTAL REGIONS
E C Henry (GE), B A Noval (GE), and D R Ulrich (GE)
Mar 1977
M-F S-23409 **Vol 1, No 4, p 581**

Technique of improved ceramic-oxide crystal growth utilizes high viscosity solutions (glass or fused solvent) Compositions are selected on basis of technical importance gravity sensitive properties, and apparent compatibility Seeded fused-solvent technique uses bismuth germanate, lithium niobate or lead germanate

B76-10525
VISCOELASTIC FOAM CUSHION
C C Kubokawa and C Yost (Dyn Systems Inc)
Mar 1977 See also B72-10692 B73-10495
ARC-11089 **Vol 1, No 4, p 582**

Foam is viscous and elastic with unusual and useful temperature, humidity, and compression responses Applied weight and pressure distributed equally along entire interface with foam eliminates any pressure points Flexible urethane foam is ideal for orthopedic and prosthetic devices, sports equipment, furniture, and crash protection

B76-10526
STRESS-CORROSION CRACKING DUE TO HYDRAZINE
M J Adamson and W P Gilbreath
Mar 1977
ARC-11093 **Vol 1, No 4, p 583**

Stress corrosion cracking susceptability in presence of hydrazine is examined for 6061-T6, Ti-6A1-4V(STA), Inconel 718, 410 stainless steel and 4130 steel alloys

B76-10527
MULTISPECIES TRANSIENT SIMULATOR
A L Lee (Lockheed Missiles and Space Co)
Mar 1977
MSC-14862 **Vol 1, No 4, p 583**

Computer program predicts transient pressure variation of multispecies gases in large vacuum systems composed of interconnecting compartments

B76-10528
MULTILAYER INSULATIVE SYSTEMS
K L Brinkley and C M Pittman
Mar 1977
LANGLEY-12057 **Vol 1, No 4, p 583**

One dimensional numerical analysis of transient thermal response multilayer insulative system determines temperature distribution through system consisting of one to four layers Program based on this analysis will determine thickness of specified layer that will satisfy specified temperature-limit criterion at any point in insulative system

B76-10529
RAPID KINETICS
A G McLain and C S R Rao (Old Dominion Univ)
Mar 1977
LANGLEY-12140 **Vol 1, No 4, p 584**

Hybrid program for chemical kinetics provides rapid solution to problems involving flowing or static, chemically reacting, gas mixtures

05 LIFE SCIENCES

B76-10073
QUANTITATIVE BIOLUMINESCENT DETECTION OF BACTERIA
E W Chappelle and G L. Picciolo
Mar 1976
GSFC-12003 **Vol 1, No 1, p 81**

Phosphoflavins in sample are measured using photobacterial luciferase assay technique for flavin mononucleotide (FMN) Boiling perchloric acid is used to rupture cells to free bound flavin and to hydrolyze flavin adenine dinucleotide to FMN Base-stabilized water solution of sodium borohydride is used as reactant

B76-10074
EXERCISE SUPPORT FOR THERAPY
M J Long and S C Irick
Mar 1976
LANGLEY-11975 **Vol. 1, No. 1, p 82**

Constant-value weight-relieving apparatus, which moves on rollers on overhead track, supports weight of walking stooping squatting, or standing patient with combination of multiple pulleys and spring clusters Individually preselected support force is constant for all movements

B76-10075
MYOCARDIAL WALL-THICKNESS TRANSDUCER
C Feldstein, G W Lewis, R H Silver and V H Culler
Mar 1976
NPO-13644 **Vol 1, No 1, p 83**

Device consists of highly compliant circular beam attached to piezoresistive strain gage and barbed needle Radial deflection of myocardium is measured with minimal disturbance of normal heart functions

B76-10076
LIGHTWEIGHT ORTHOTIC APPLIANCES
R M Baucom and T L St Clair
Feb 1976
LANGLEY-11918 **Vol 1, No 1, p 84**

Graphite-filament reinforced polymer materials are used in applications requiring high tensile strength and modulus Superior properties of graphite composite materials permit fabrication of

supports that are considerably lighter, thinner, and stiffer than conventional components

B76-10077
REMOTE, UNATTENDED, FOREST FIRE DETECTOR
D J Winslow
Mar 1976
M-FS-21221 **Vol 1, No 1, p 85**

Instruments for land tract scanning and fire detection include temperature sensor capable of detecting distant match flame, elevated television camera with automatic controls for light balance position, filter, and focus and scanner equipped with photocell to sense intensity of flying spot brought to it by *sweep-and-scan mechanism*

B76-10078
PROTON TISSUE DOSE
J W Wilson and G S Khandelwal (Old Dominion Univ)
Mar 1976
LANGLEY-11802 **Vol 1, No 1, p 85**

Program calculates dosage averaged over five major segments of blood-forming organ treating human body geometry in detail but *assuming isotropicity of incident primary particles* Approximate form of transport theory is used incorporating nuclear star effects Two numerical integrations are used to evaluate intermediate equation and then dosage equation

B76-10207
OCCLUSIVE-CUFF CONTROLLER
J T Baker (Technol Inc), G W Hoffler (Technol Inc), and W Hursta
Aug 1976
MSC-14836 **Vol 1, No 2, p 217**

Device can be automatically set to supply desired amount of pressure for given time and may be triggered manually or from patient's electrocardiograph

B76-10208
FIREFLIGHTER'S BREATHING SYSTEM
P B McLaughlan, E A Gorgini (Scott Aviation) J L Sullivan (Scott Aviation), M R Simmonds (Scott Aviation), and E J Beck (Martin Marietta Corp)
Aug 1976
MSC-14733 **Vol 1, No 2 p 218**

System, based on open-loop demand-type compressed air concept, is lighter and less bulky than former systems, yet still provides thirty minutes of air supply Comfort visibility, donning time, and breathing resistance have been improved Apparatus is simple to recharge and maintain and is comparable in cost to previously available systems

B76-10209
MANUAL DEXTERITY EVALUATOR
H P Bergeron, J D Holt and P A Gainer
Aug 1976
LANGLEY-12022 **Vol 1, No 2, p 219**

Device incorporates relatively inexpensive, simple hand-controlled tracker that moves over horizontal two-dimensional surface Device is applicable as a two-dimensional or three-*dimensional plotter to perform as X/Y curve plotter area calculator* under a randomly shaded curve, and displacement tracker

B76-10210
ASEPTIC FLUID-TRANSFER SYSTEM
J C Arnett R M Berkman, and E L Cleland
Aug 1976
NPO-13743 **Vol 1, No 2, p 220**

Inexpensive storage and transfer system allows blood and other fluids to be added or removed without contamination Device heat-sterilizes external surfaces of terminals and forms sterile passageway between terminals

B76-10211
GRAPHITE-REINFORCED BONE CEMENT
A C Knoell
Aug 1976
NPO-13764 **Vol 1, No 2, p 221**

Chopped graphite fibers added to surgical bone cement form bonding agent with mechanical properties closely matched to those of bone Curing reaction produces less heat, resulting in *reduced traumatization of body tissues Stiffness is increased* without affecting flexural strength

B76-10212
PHYSICIAN'S MODERN 'BLACK BAG'
C K Lapinta J L Day, A E Schulze (Telecare Inc) and G A Zivley (Telecare, Inc)
Aug 1976
MSC-14936 **Vol 1, No 2, p 222**

Physician's capabilities for on-site treatment are expanded by lightweight compact medical kit, which contains practically all instrumentation of well-equipped medical office

B76-10213
BIRTH/DEATH PROCESS MODEL
C B Solloway and W Wakeland (Harvey Mudd Coll)
Aug 1976
NPO-13616 **Vol 1, No 2, p 224**

First-order Markov model developed on digital computer for population with specific characteristics System is user interactive, self-documenting, and does not require user to have complete understanding of underlying model details Contains thorough error-checking algorithms on input and default capabilities

B76-10362
MEASURING MANDIBULAR MOTIONS
J Dimeff, S Rositano, and R C Taylor (California Univ)
Jan 1977
ARC-10956 **Vol 1, No 3, p 391**

Mandibular motion along three axes is measured by three motion transducers on floating yoke that rests against mandible System includes electronics to provide variety of outputs for data display and processing Head frame is strapped to test subject s skull to provide fixed point of reference for transducers

B76-10363
DISPOSABLE BIOMEDICAL ELECTRODE
J D Frost Jr (Methodist Hosp, Houston, Tx) and C E Hillman, Jr (Methodist Hosp, Houston Tx)
Jan 1977 See also B72-10642 B76-10364
MSC-14623 **Vol 1, No 3, p 392**

Reusable recording cap equipped with compressible snap-on bioelectronic electrodes is worn by patient to allow remote monitoring of electroencephalogram and electro-oculogram waveforms Electrodes can be attached to inside surface of stretch-textile cap at twelve monitoring positions and at one or *two ground positions*

B76-10364
AUTOMATED EEG ACQUISITION
J D Frost Jr (Methodist Hosp Houston, Tx) and C E Hillman, Jr (Methodist Hosp, Houston Tx)
Jan 1977 See also B76-10363, NASA-CR-147554 (N76-22888)
MSC-16111 **Vol 1, No 3, p 393**

Automated self-contained portable device can be used by technicians with minimal training Data acquired from patient at remote site are transmitted to centralized interpretation center using conventional telephone equipment There, diagnostic information is analyzed, and results are relayed back to remote site

B76-10365
REMOTE WATER-MONITORING SYSTEM
D C Grana and D P Haynes
Jan 1977
LANGLEY-11973 **Vol 1, No 3, p 395**

General-purpose, water-quality sampling process detects microorganisms and integrates sampling sample preservation, and sample analysis System overcomes difficulties in correlation of surface measurements with remote measurements and minimizes human error in handling of samples and instrumentation

B76-10366
ROCKING-MOTION SENSOR FOR THE BLIND
A Mandell, J E Morgan (Martin Marietta Corp), and J T Polhemus (Martin Marietta Corp)
Jan 1977
MSC-14805 **Vol 1, No 3, p 396**
Feedback system notifies wearer when specific types of body motion occur

B76-10367
ACCELERATOR FOR BIOMEDICAL STUDIES
G L Shillinger, Jr
Jan 1977
ARC-10898 **Vol 1, No 3, p 398**
Spring-operated accelerator produces precise and repeatable linear accelerations

B76-10368
MULTIPOSITION RESCUE LITTER
R L Robbins (Rockwell Intern Corp)
Jan 1977
MSC-16148 **Vol 1, No. 3, p 399**
Lightweight stretcher has wide range of applicability in emergency situations Special hinges and supports eliminate need for separate accessory items and save weight and storage space

B76-10369
SHORT-RANGE BIOTELEMETRY SYSTEM
R Lorentz (Southwest Res Inst)
Jan 1977 See also NASA-CR-144640 (N76-14474)
MSC-16011 **Vol. 1, No 3, p. 400**
Compact VHF transmitter relays EKG, EEG, and EMG data to receiver located over twenty-five feet away Device can be used to monitor postoperative patients without cumbersome wires

B76-10370
DAM - DETECTION AND MAPPING
Innovator not given Jan 1977
MSC-16096 **Vol. 1, No. 3, p 401**
Integrated set of manual procedures, computer programs, and graphic devices processes multispectral scanner data from orbiting LANDSAT into precisely registered and formatted maps of surface water and other resources at variety of scales, sheet formats, and tick intervals

B76-10530
MEAL SYSTEM FOR THE ELDERLY
G R Primeaux, R G Ritz (Martin Marietta Corp), and G A Hruzak (Technol, Inc)
Mar 1977 See also NASA-CR-144516 (N76-10898)
MSC-16062 **Vol 1, No 4, p 587**
Packaged meals require no refrigeration and are nutritionally balanced Single-serving portions are delivered in multiunit packs and are conveniently prepared in the home

B76-10531
CAUTION AND WARNING SYSTEM
T M McClung (Garrett Corp), J T Parker (Garrett Corp), and P D Peterson (Garrett Corp)
Mar 1977 See also NASA-CR-144432 (N75-32760)
MSC-16046 **Vol 1, No 4, p 588**
Battery-operated, biomedical-monitoring and display network is used for intensive-care and patient monitoring Digital, bus-oriented design enhances simplicity, flexibility, and noise immunity advantages Network is 100 percent reprogramable Malfunctions are immediately displayed, accompanied by proper corrective procedures

B76-10532
INTERLOCKING BUTTERFLY TOURNIQUET
L J Raggio (Rockwell Intern Corp) and B E Green (Rockwell Intern Corp)
Mar 1977
MSC-19382 **Vol 1, No 4, p 589**
Adjustable bandage, designed for one-handed application, closes skin lacerations to any desired degree

B76-10533
LIQUID-COOLED BRA FOR CANCER DETECTION
B A Willams, W E Elkins (Aerotherm Corp), and E G Tickner (Aerotherm Corp)
Mar 1977 See also B74-10249
ARC-11007 **Vol. 1, No 4, p 590**
Garment cools entire breast area uniformly, improving sensitivity of thermographic techniques Flow and temperature of coolant are controlled by system which also monitors skin temperature

B76-10534
INEXPENSIVE PORTABLE DRUG DETECTOR
J Dimeff, A H Heimbuch, and J A Parker
Mar 1977
ARC-10633 **Vol 1, No 4, p 591**
Inexpensive, easy-to-use, self-scanning, self-calibrating, portable unit automatically graphs fluorescence spectrum of drug sample Device also measures rate of movement through chromatographic column for forensic and medical testing

B76-10535
IN VIVO BONE-STRAIN TELEMETRY
D R Young, W H Howard, and E Koenigsberg (Koenigsberg Instr Co)
Mar 1977
ARC-11074 **Vol 1, No 4, p 592**
System permits long-term measurement of strains resulting from applied skeletal loads Basic scheme utilizes pulse interval modulation

B76-10536
FAST MEASUREMENT OF BACTERIAL SUSCEPTIBILITY TO ANTIBIOTICS
E W Chappelle, G L Picciolo, and C G Schrock (New England Med Center)
Mar 1977 See also B76-10073
GSFC-10246 **Vol. 1, No 4, p 592**
Method, based on photoanalysis of adenosine triphosphate using light-emitting reaction with luciferase-luciferin technique, saves time by eliminating isolation period required by conventional methods Technique is also used to determine presence of infection as well as susceptibilities to several antibiotics

B76-10537
BIOMEDICAL ULTRASONOSCOPE
R D Lee
Mar 1977
ARC-10994 **Vol 1, No 4, p 593**
Portable, battery-powered device permits noninvasive examination of body's interior and is particularly well suited to real-time examination of heart Instrument is capable of C-mode, A-mode, and M-mode scan display

B76-10538
AUTOMATIC MULTIPLE APPLICATOR ELECTROPHORESIS
B W Grunbaum (California Univ, Berkeley)
Mar 1977
ARC-10991 **Vol 1, No 4, p 594**
Easy-to-use, economical device permits electrophoresis on all known supporting media System includes automatic multiple-sample applicator, sample holder, and electrophoresis apparatus System has potential applicability to fields of taxonomy, immunology, and genetics Apparatus is also used for electrofocusing

B76-10539
MINIATURE EMERGENCY OXYGEN UNIT
R S Gubin, H H Franks, R G Baynes (Bendix Corp), and J A Johnson (Bendix Corp)
Mar 1977
KSC-11011 **Vol 1, No 4, p 596**
Portable compact device includes resuscitation, inhalation, and aspiration modes Device reduces extra time required to carry larger apparatus

B76-10540
MULTISPECTRAL IMAGING FOR MEDICAL DIAGNOSIS
V J Anselmo
Mar 1977
NPO-13922 **Vol 1, No 4, p 597**

Photography technique determines amount of morbidity present in tissue Imaging apparatus incorporates numerical filtering Overall system operates in near-real time Information gained from this system enables physician to understand extent of injury and leads to accelerated treatment

B76-10541
AN ARTIFICIAL LEG FOR HIP DISARTICULATION
W C Valloton
Mar 1977
ARC-10916 **Vol 1, No 4, p 598**

Apparatus uses energy-storage and damping devices to assist wearer in achieving more normal stride and pace

06 MECHANICS

B76-10079
HYDROSTATIC LIFT-OFF SEAL
P S Buckmann (Aerojet-Gen Corp)
Mar 1976
M-FS-21496 **Vol 1, No 1, p 87**

Interpropellant turbopump oxidizer seal consists of smooth flat surface on back of second-stage oxidizer impeller, floating seal ring, semistatic piston ring secondary seal, and low pressure flexible-bellows static secondary seal Seal performs static sealing at rest and controlled leakage sealing in operation

B76-10080
IMPROVED CRYOGENIC SHAFT SEALS
W A Gillon Jr (Rockwell Intern Corp) and G F Tellier (Rockwell Intern Corp)
Mar 1976
M-FS-19153 **Vol 1, No 1, p 88**

Seals are designed for use with liquid propellant ball valves at temperatures ranging from -400 F to 130 F and 8,000 psig Seals are capable of sustaining 90 degree rotation, with substantial amount of lateral and axial play caused by large pressure loads and differential thermal contraction

B76-10081
COST SAVING SYNERGISTIC SHAFT SEAL
L P Ludwig and T N Strom
Mar 1976
LEWIS-12119 **Vol 1, No 1, p 90**

Segmented carbon rings used to replace elastomeric seal lip, provide resistance to high temperatures generated in lubricating film Machining and close manufacturing tolerances of conventional segmented seal are avoided by mounting segmented rings in elastomeric flex section

B76-10082
PEAK-ACCELERATION LIMITER
R C Woodbury
Mar 1976
NPO-11940 **Vol 1, No 1, p 91**

Statistical limiter, which protects test specimens during random vibration testing, differentiates between peak acceleration levels that are normal components of vibration signal and those that exhibit damaging characteristics Device aborts test only when statistical properties of vibration signal change significantly or when catastrophic transient occurs

B76-10083
VACUUM-JACKETED LINE SPACER
F A Houte (McDonnell-Douglas Corp), H B Mckee (McDonnell-Douglas Corp), and T C Patten (McDonnell-Douglas Corp)
Mar 1976
MSC-14365 **Vol 1, No 1, p 92**

Device has three integral, equally spaced leaf springs Springs separate outer vacuum jacket from fluid carrying line yet minimize conductive heat leaks and liquid boiloff One-piece heat spring has sufficient flexibility to accommodate differential thermal expansion of inner and outer line

B76-10084
INEXPENSIVE LEAK-DETECTOR ENVELOPE
T F Lyon (GE)
Mar 1976
LEWIS-11305 **Vol 1, No 1, p 93**

Vacuum chamber is used with mass spectrometer to leak-check helical coils of tubing in large systems

B76-10085
ZERO-ANGLE HELICAL COIL
J A Troendle (Lockheed Missiles and Space Co)
Mar 1976
GSFC-10969 **Vol 1, No 1, p 94**

Device is constructed of bimetallic stock material formed into segments of small diameters and fastened together by metal strips Coil is useful in various types of actuators, such as temperature controls

B76-10086
REDUCING COLD FLOW IN ELASTOMERIC O-RINGS
R H Henry (Rockwell Intern Corp) and O K Olsen (Rockwell Intern Corp)
Mar 1976
M-FS-24336 **Vol 1, No 1, p 94**

Pretreatment technique accelerates compression set of O-rings seal is pressure loaded, seal and pressure mechanisms are heated to 160 F, load is applied to heated seal causing material to flow, parts are cooled to room temperature, and load is removed

B76-10087
FAST PRESSURE-SENSOR SYSTEM
C Gross
Mar 1976
LANGLEY-12003 **Vol 1, No 1, p 96**

Miniature silicon-diaphragm sensors and signal multiplexer are mounted to ganged zero-operate-calibrate pressure selector switches Device allows in-situ calibration, can be computer controlled, and measures at approximately 10,000 readings per second

B76-10088
NONCONTAMINATING METHOD FOR VISUALIZING GAS FLOW
F S Stepka D Poferl, and R J Goldstein (Minnesota Univ)
Mar 1976 See also NASA-CR-72991 (N72-14945)
LEWIS-12076 **Vol 1, No 1, p 97**

Fog, formed from dry ice and water, is used to simulate coolant inside pressure-tight tank Coolant's interaction with mainstream flow is observed visually and photographed

B76-10089
FLUID CLASSIFIER AND DISSEMINATOR
W C Kocmond (Cornell Aeron Lab Inc) and V A Depalma (Cornell Aeron Lab Inc)
Mar 1976
HQN-10748 **Vol 1, No 1, p 97**

Air-jet mill has two modifications, particle channel and large-particle exhaust port

B76-10090
SHOCK-TUBE DRIVER
L P Leibowitz
Mar 1976
NPO-13528 **Vol 1, No 1, p 98**

Annular-arc accelerator consists of cold gas driver expansion section, electrode sections, and shock tube section Triggering improvement provides higher velocities and reduces contamination.

B76-10091
SELF-CONTAINED CONSTANT-TEMPERATURE HEAT ABSORBER
R W Lopez, J L Vanıman, and R R Fısher
Mar 1976
M-FS-22989 **Vol 1, No 1, p 100**
System maintains precise thermal control of heat producing component is not affected by changes in external pressure, ambient thermal environment, or gravity, and operates in both static and spinning attitudes Size of device s spin axis-oriented orifice determines container pressure which establishes boiling temperature of heat absorption medium

B76-10092
LIQUID-RETENTION CANOPY
J H Dawson (Rockwell Intern Corp) and A F Brux (Rockwell Intern Corp)
Mar 1976
M-FS-24133 **Vol 1, No 1, p 101**
Device prevents severe fuel sloshing and bubbling and redirects fluid motion to tank bottom Cryogenic boiloff wetted wall areas, and pressure collapse are reduced

B76-10093
INTRODUCING CONTROLLED MATTER INTO A FLUID SYSTEM
C E Hoffman (Rockwell Intern Corp)
Mar 1976
M-FS-24309 **Vol 1, No 1, p 102**
Device consisting of capsule holder and glass inner tube has been developed to handle controlled particulate-contamination samples Premeasured quantity of particles can be injected into closed fluid system without contamination

B76-10094
PROPELLANT SIDE FEED
W J Guman (Fairchild Hiller Corp)
Mar 1976
LANGLEY-11082 **Vol 1, No 1, p 103**
New solid-propellant configurations increase thrust-to-power ratio of pulsed plasma microthruster and provide possibility of varying thrust Techniques are adaptable to sputter coating of polymeric material or pulsed ablating light sources

B76-10095
RESISTANCE HEATING ELEMENTS WITH SPECIFIC HEATING PROFILES
M H Hirschberg
Mar 1976
LEWIS-10719 **Vol 1, No 1, p 104**
Bundled interrupted resistance heating elements provide specific heating profiles Design allows for easily tailored lengths and locations of hot sections' and larger surface areas for heat radiation

B76-10096
ANALYTIC NUMERICAL SOLUTIONS FOR SHOCK WAVES
R W MacCormack and A J Paullay (Bronx Community Coll / CUNY)
Mar 1976
ARC-10959 **Vol 1, No 1, p 105**
Study of weak solutions of simple wave equation inviscid Burgers equation, and Euler equations has resulted in technique for accurate prediction of shock waves occurring in inviscid supersonic flows

B76-10097
MEASUREMENT OF RAPIDLY-CHANGING HEATING RATES
E W Schwartz (General Dynamics Corp)
Mar 1976
LANGLEY-11380 **Vol 1, No 1, p 106**
Easily-fabricated heating rate sensor accurately measures heating rates that are changing rapidly Design is based on numerous heat transfer analyses Calibration is required but no maintenance is needed other than for the thermocouple system

B76-10098
JPL SOLAR POWER EXPERIMENTS
R K Yasui
Mar 1976
NPO-13461 **Vol 1, No 1, p 107**
Report describes evolution of photovoltaic power systems designed and built for terrestrial use Discussion focuses on technological problems impeding further systems development Experiments and test data on seven types of solar panels and six material test specimens are described in detail

B76-10099
GUST ALLEVIATION FOR STOL AIRCRAFT
W I Oehman
Mar 1976 See also NASA-TN-D-7202 (N73-20013)
LANGLEY-11413 **Vol 1, No 1, p 107**
Analytical study suggests method of improving flight performance of airplanes having relatively low wind loading and those flying at low altitudes

B76-10100
OUTER FLOW AND TURBULENCE IN BOUNDARY LAYERS
W C Cliff and V A Sandborn
Mar 1976
M-FS-23286 **Vol 1, No 1, p 108**
Results presented in report indicate that perturbations travel through boundary layer and give rise to turbulence production process which occurs near viscous sublayer Part of turbulence produced near wall in turn, moves outward and eventually produces convoluting outer edge of boundary layer to reproduce and sustain itself

B76-10101
PRESSURE TUBE INSTRUMENTATION
G Foerster, O Mehmed, and R Mueller
Mar 1976
LEWIS-12539 **Vol 1, No 1, p 108**
Set of standards in the form of drawings provides detailed information about materials fastening techniques surface finishes critical dimensions quality control specifications and installation methods for variety of static and total pressure tube instrumentation

B76-10102
JOULE-THOMSON DATA CURVES
H W Beimgraben (Boeing Co)
Mar 1976
KSC-10538 **Vol 1, No 1, p 109**
Series of graphs shows temperature-pressure relationship for air nitrogen, helium, oxygen, and hydrogen when flowing across line restriction over wide range of temperatures and pressures Graphs can be applied as engineering guides for component manufacturers and piping system designers

B76-10103
OPTIMAL INSENSITIVE-CONTROLLER SYNTHESIS
C A Harvey (Honeywell, Inc) and Y S Lee (Honeywell Inc)
Mar 1976
M-FS-21666 **Vol 1, No 1, p 109**
Proof of two theorems is included in report local sufficiency condition for existence of insensitive controllers in the case of sufficiently small parameter variations and necessary condition for optimal controller corresponding to point in boundary of domain of admissible parameter variations to be optimal insensitive controller

B76-10104
NASTRAN COMPONENT-MODE SYNTHESIS
R J Guyan (Rockwell Intern Corp)
Mar 1976
MSC-19632 **Vol 1, No 1, p 110**
Procedure for dynamic substructuring analysis technique is generally as follows calculation of component modes selection of component normal modes calculation of component generalized matrices assembly of system matrices, and computation of normal modes, and retrieval of component response

B76-10105
MINIVER MINIATURE VERSION OF REAL/IDEAL GAS AERO-HEATING AND ABLATION COMPUTER PROGRAM
D R Hendler (McDonnell-Douglas Corp)
Mar 1976
M-FS-21951 **Vol 1, No 1, p 110**
Computer code is used to determine heat transfer multiplication factors, special flow field simulation techniques, different heat transfer methods, different transition criteria, crossflow simulation, and more efficient thin skin thickness optimization procedure

B76-10106
ESOP VERSION IV ENERGY SYSTEMS OPTIMIZATION PROGRAM
Innovator not given (Lockheed Electronics Co) Mar 1976
MSC-14854 **Vol 1, No 1, p 110**
Program has six general analytical components waste disposal heating/cooling loads, energy requirements, power generation, waste water treatment, and conventional utility system

B76-10107
TANGENT-OGIVE NOSE CONES
L D Wing
Mar 1976
GSFC-11468 **Vol 1, No 1, p 111**
Program calculates aerodynamic heating and shear stresses at wall for tangent-ogive noses that are slender enough to maintain an attached nose shock during portion of flight when heat transfer from boundary layer to wall is significant

B76-10108
DYNGEN
J F Sellers and C J Daniele
Mar 1976
LEWIS-12506 **Vol 1, No 1, p 111**
Steady-state and transient performance of turbofan and turbojet engines are analyzed Program uses large time steps, gives analyst freedom in selecting equations needed to describe system, and eliminates discrepancies in answers often generated by transient and steady-state simulations

B76-10109
VENTING FOR CONDENSATION IN GAS LINES
R A Moses (Rockwell Intern Corp)
Mar 1976
MSC-19621 **Vol 1, No 1, p 112**
Computer program provides information on quantity of condensate and effect of line heat transfer and temperature on eliminating or minimizing condensate that might affect gas flow adversely

B76-10110
REJECT
B H Anderson
Mar 1976
LEWIS-12375 **Vol 1, No 1, p 112**
Computer program determines performance and flow field characteristics of supersonic ejector nozzle It includes sonic line effects and interaction analysis for mixing process between primary and secondary flows of nozzle

B76-10111
BUCLAP2
D W Halstead (Boeing Co) L L Tripp (Boeing Co), M Tamekuni (Boeing Co) L L Baker (Boeing Co) and A V Viswanathan (Boeing Co)
Mar 1976
LANGLEY-11696 **Vol 1, No 1, p 112**
Program is used to predict buckling of rectangular flat and curved laminated plates subjected to in-plane normal and shearing loads with each lamina composed of orthotropic material with arbitrary orientation of orthotropic axes

B76-10112
SWEPT-TAPERED-WING AERODYNAMICS
L E Putnam
Mar 1976
LANGLEY-11701 **Vol 1, No 1, p 113**
Computer program calculates effects on lift and drag of blowing two jets over swept tapered wing at low subsonic speeds Algorithm used in based on vortex lattice representation of wing lifting surface on line source-sink distribution to represent effects of exhaust jets

B76-10113
SESOP PROGRAM FOR SOLAR-ENERGY HEATING-SYSTEMS ANALYSIS
Innovator not given (Lockheed Electronics Co) Mar 1976
MSC-14853 **Vol 1, No 1, p 113**
Space heating and cooling loads are calculated for each building based on outside environment, desired inside conditions, building construction and geometry, domestic power usage, occupancy rate, and occupant metabolic rate Loads are summed to determine requirements of central and alternative utility systems

B76-10214
CONSTANT-RATE FLUID-DELIVERY SYSTEM
D S Jacob (Beckman Instr, Inc)
Aug 1976
MSC-14905 **Vol 1, No 2, p 227**
Mechanical-feedback regulated modulating valve maintains pressure in bag equal to that within bellows, causing fluid to be expelled at a constant rate Adaptable to systems where bellows are replaced by cylinders bladders, or diaphragms

B76-10215
ROUS SYSTEM
J S Heyman
Aug 1976
LANGLEY-12015 **Vol 1, No 2, p 228**
Ultrasonic generator/monitor, appropriate for lab and field use is used to measure ultrasonic parameters and determine certain physical properties of test region Reflection-oscillator ultrasonic spectrometer is sensitive, inexpensive, has no duty-cycle effects, is simple in construction and use, and for resonance measurements, takes advantage of sensitivity enhancement, and has high frequency stability

B76-10216
ROUS BOLT-TENSIONING MONITOR
J S Heyman and F D Stone
Aug 1976
LANGLEY-12016 **Vol 1, No 2, p 229**
Closed-loop feedback circuit system used to measure bolt tension Advantages are its simplicity, higher accuracy, and potential low cost

B76-10217
COMPUTER-AUTOMATED ULTRASONIC INSPECTION SYSTEM
D Dunmyer (General Dynamics Corp), A H Gardner (General Dynamics Corp), E E Kerlin (General Dynamics Corp), J S Kunselman (General Dynamics Corp), A R Robinson (General Dynamics Corp), T C Walker (General Dynamics Corp), T G Wells (General Dynamics Corp), and B G W Yee (General Dynamics Corp)
Aug 1976
M-FS-23338 **Vol 1, No 2, p 230**
Computer system automatically analyzes and records ultrasonic weld inspection data Unit can be operated in three modes manual, automatic and computer-controlled

B76-10218
FAIL-SAFE HYDRAULIC SHAKER PROTECTION
R C Woodbury
Aug 1976
NPO-13726 **Vol 1, No 2, p 231**
Nine channel system controls acceleration and force on structure undergoing vibration stress testing System has automatic and manually operative abort feature

B76-10219
PUMP FAILURE MONITOR
J L Frarey (Shaker Res Corp), D S Wilson (Shaker Res Crop) and R F Burchill (Shaker Res Corp)
Aug 1976
M-FS-23366 **Vol 1, No 2, p 232**
High-frequency vibration technique predicts failure in pumps

B76-10220
VAPOR/LIQUID INTERFACE SENSOR
J E Briegy
Aug 1976
MSC-12474 **Vol 1, No 2, p 233**
Fluidic circuit senses level of liquid nitrogen in pipe or container by responding to pressure changes

B76-10221
IMPROVED HIGH-TEMPERATURE HEATER WITH STABILIZED-ZIRCONIA ELEMENTS
C R Halbach (Advanced Res and Technol) and R J Page (Advanced Res and Technol)
Aug 1976
M-FS-23351 **Vol 1, No 2, p 234**
Improved conducting-ceramic heating elements extend performance and life expectancy of 2 100 C furnace

B76-10222
HOT-WIRE PROBE
V Mikulla
Aug 1976
ARC-10900 **Vol 1, No 2, p 236**
High-temperature platinum probe measures turbulence and Reynolds shear stresses in high-temperature compressible flows Probe does not vibrate at high velocities and does not react like strain gage on warmup

B76-10223
'THERMAL-DIODE' HEAT PIPE
J P Kirkpatrick, B Swierdling (Grumman Aircraft Corp) and R Kosson (Grumman Aircraft Corp)
Aug 1976
ARC-10997 **Vol 1, No 2, p 237**
Device transfers heat in one direction and blocks heat transfer in opposite direction

B76-10224
FATIGUE LIFE OF SPUR AND HELICAL GEAR SETS
D P Townsend E V Zaretsky and J J Coy (USAAMRDL)
Aug 1976 See also NASA-TN-D-8029 (N75-29434), NASA-TN-D-8045 (N75-30564)
LEWIS-12596 **Vol 1, No 2, p 238**
Mathematical model is used to determine surface fatigue life of spur and helical gears Can also be used to calculate dynamic capacity

B76-10225
FASTER X-RAY ANALYSIS OF SEMICONDUCTOR WAFERS
D L Parker (Texas A and M Univ) and W A Porter (Texas A and M Univ)
Aug 1976
M-FS-23315 **Vol 1, No 2, p 238**
X-ray camera, through use of vacuum chuck significantly reduces cost per topograph by bending semiconductor wafer by at least one order of magnitude

B76-10226
ATTENUATION OF SOUND IN DUCTS WITH ACOUSTIC TREATMENT
E J Rice
Aug 1976 See also NASA-TM-X-71830 (N76-12827)
LEWIS-12686 **Vol 1, No 2, p 239**
Generalized approximate equation for duct-lining sound attenuation can be used for initial acoustic-liner design and analysis

B76-10227
FROZEN-FLUID LINE REPAIR
J A Stein (Rockwell Intern Corp)
Aug 1976
MSC-19132 **Vol 1, No 2, p 240**
Improved line-freezing equipment permits fluid line repairs in previously inaccessible areas

B76-10228
SIMPLIFIED EXPLOSIVE-WELD EVALUATION
D M McLarty (Martin Marietta Corp)
Aug 1976
MSC-14654 **Vol 1, No 2, p 241**
Weld surfaces coated with commercially available molybdenum disulfide, allow visual inspection of significant indications of bond quality Process reduces number of trial welds making explosive bonding more competitive

B76-10229
NOMOGRAPH FOR CASTOR-CUSHION DESIGN
G L Dillard (Rockwell Intern Corp)
Aug 1976
MSC-17094 **Vol 1, No 2, p 242**
Diagram aids development of castor cushions with individual suspension characteristics

B76-10230
CABLE-LOAD EQUALIZATION SYSTEM
R W Benjamin (Rockwell Intern Corp)
Aug 1976
MSC-17494 **Vol 1, No 2, p 243**
Limited-slip differential, used to drive dual-cable winches synchronizes winding speeds and ensures equal loading of both cables

B76-10231
ANALYSIS OF BONDED JOINTS
S R Srinivasa (Argonne Natl Lab)
Aug 1976 See also NASA-TN-D-7855
LANGLEY-11871 **Vol 1, No 2, p 243**
Report describes analysis of single-lap double-lap and flush joints for peel and shear stresses

B76-10232
FLUID HANDLING EQUIPMENT
Innovator not given Aug 1976 See also NASA-SP-5976(03)
HQN-10890 **Vol 1, No 2, p 244**
Report describes twenty-four concepts and methods developed for fluid transport technology

B76-10233
HEAT PIPE TECHNOLOGY
Innovator not given (New Mexico Univ) Aug 1976
HQN-10901 **Vol 1, No 2, p 244**
Continuing bibliography with abstracts of technical reports, books, conference papers foreign reports and translations, patents, and other documents Author subject and patent indexes included

B76-10234
CRYOGENIC STORAGE TANK THERMAL ANALYSIS
J P Wright (Rockwell Intern Corp)
Aug 1976
MSC-19103 **Vol 1, No 2, p 244**
Parametric study discusses relationship between cryogenic boil-off and factors such as tank size insulation thickness and performance structural-support heat leaks and use of vapor-cooled shields Data presented as series of nomographs and curves

B76-10235
SOLAR HEATING AND COOLING PERFORMANCE
J W Littles and J C Cody
Aug 1976
M-FS-23432 **Vol 1, No 2, p 245**
Study describes technique developed for comparison of devices to determine if conventional energy resources may be saved

B76-10236
THERMAL NETWORK MODELING HANDBOOK
Innovator not given (TRW Systems Group) Aug 1976 See also NASA-CR-144418 (N75-30483)
MSC-14964 **Vol 1, No 2, p 245**
Reference describes standard formulas, techniques, and terminology used in constructing mathematical models

B76-10237
IMPEDANCE OF CURVED DUCTS
W A Rostafinski
Aug 1976 See also NASA-TM-X-2698 (N73-15705) NASA-TM-X-71827 (N76-13881)
LEWIS-12636 **Vol 1, No 2, p 245**
Mathematical solution permits showing that, for circular bends in hardwalled ducts of rectangular cross sections, specific acoustic impedance depends on both frequency and geometry of bend

B76-10238
REMOTE SENSING OF NATURAL RESOURCES
Innovator not given (New Mexico Univ) Aug 1976
HQN-10899 **Vol 1, No 2, p 246**
Quarterly literature review compiles citations and abstracts from eight major abstracting and indexing services Each issue contains author/keyword index Includes data obtained or techniques used from space, aircraft or ground-based stations

B76-10239
NECAP NASA ENERGY-COST ANALYSIS PROGRAM
Innovator not given (GATX Inc) Aug 1976
LANGLEY-11888 **Vol 1, No 2, p 247**
Computer program evaluates design and operation of facilities in regard to building energy consumption

B76-10240
SHOCK INTERFERENCE PATTERNS AND HEATING
D J Morris and J W Keyes
Aug 1976
LANGLEY-11497
Computer programs calculate two-dimensional patterns for six types of supersonic and hypersonic interference flow fields and surface heating

B76-10241 **Vol 1, No 2, p 248**
COMOC A FINITE-ELEMENT ALGORITHM FOR THE NAVIER-STOKES EQUATIONS
A J Baker (Bell Aerospace Corp), A M Bauer (Bell Aerospace Corp), P D Manhardt (Bell Aerospace Corp), and J A Orzechowski (Bell Aerospace Corp)
Aug 1976
LANGLEY-11480 **Vol 1, No 2, p 247**
Finite-element algorithm devised to facilitate solution of two-dimensional Navier-Stokes equations governing kinematics and thermodynamics of variable-viscosity, compressible, multiple-species fluid Algorithm has been implemented into existing computer program system

B76-10242
PREDICTING OFF-DESIGN PERFORMANCE OF RADIAL-INFLOW TURBINES
C A Wasserbauer and A J Glassman
Aug 1976 See also B69-10267
LEWIS-12500 **Vol 1, No 2, p 249**
Computer program is useful where performance at design operating point is known and as design guide

B76-10243
CRACK-GROWTH ANALYSIS
C Bianca and M Creager (Dell West Assoc)
Aug 1976
M-FS-23320 **Vol 1, No 2, p 249**
Flexible adaptable integrative routine computer program incorporates Collipriest-Ehret and Paris-Forman equations It calculates growth from initial defect size and terminates calculation when crack is sufficiently large for critical condition Wheeler, Willenborg and Grumman Closure models are available

B76-10371
FLEXIBLE-PILE THERMAL SEALANT
G E Anderson (Rockwell Intern Corp), D M Fell (Rockwell Intern Corp) and J S Tesinsky (Rockwell Intern Corp)
Jan 1977
MSC-19568 **Vol 1, No 3, p 405**
Brushlike material insulates variable-width gaps where severe thermal stress is present Weave-and-tuft strip has low thermal conductivity working temperature range from -454 to 2,000 F, low load compressibility, and good inhibition of plasma flow

B76-10372
ULTRASONIC MEASUREMENT OF FRACTURE TOUGHNESS
A Vary
Jan 1977 See also NASA-TM-X-71769 (N75-29241), NASA-TM-X-71889 (N76-21319)
LEWIS-12642 **Vol 1, No 3, p 406**
Inexpensive nondestructive method ranks materials by crack toughness Method can reduce expenses involved in conventional mechanical destructive testing and can be inspection tool in determining local variations of materials in fracture-prone components

B76-10373
WINGTIP SMOKE GENERATOR
J R Rogers
Jan 1977
ARC-10905 **Vol 1, No 3, p 407**
Device produces nontoxic smoke of low particle density assisting in investigation and study of aircraft wingtip vortexes in flight It can be dimensioned according to available current and oil capacity

B76-10374
MEASURING TRACE DISPERSANTS IN GAS STREAMS
O L Updike (Virginia Univ)
Jan 1977
ARC-10896 **Vol 1, No 3, p 408**
Detection system uses phase shift of acoustic waves to measure amount of gaseous substances on sorption sensor Three-part device optimizes stability and assists in achieving low-phase-noise levels

B76-10375
NOISE SUPPRESSOR FOR TURBOFAN-JET ENGINES
D Y Cheng (Santa Clara Univ)
Jan 1977
ARC-10812 **Vol 1, No 3, p 409**
Exhaust nozzle equipped with bypass separators is basis of lightweight device Innovation does not reduce thrust unduly and has no moving parts

B76-10376
AIR-SUSPENDED DYNAMOMETER TABLE
T A Casad
Jan 1977
NPO-13794 **Vol 1, No 3, p 410**
Device improves accuracy of fractional-horsepower testing

B76-10377
TIME-DOMAIN REFLECTOMETRY FOR CABLE-FAULT ISOLATION
K D Wood (IBM)
Jan 1977
KSC-10741 **Vol 1, No 3, p 411**
Instrument can be used to isolate fault at specific multiple-cable splice location

B76-10378
FLUID-FILM BEARING DAMPER
R E Cunningham
Jan 1977 See also NASA-TN-D-7987 (N75-25192)
LEWIS-11158 **Vol 1, No 3, p 412**
Device for rotating machinery has noncircular support that allows changes in dynamic properties Device can be controlled

for either manually or automatically altering its stiffness and damping properties without interruption of operation

B76-10379
ALL-NICKEL HOT-WIRE PROBE
F R Lemos
Jan 1977
ARC-10911 **Vol 1, No 3, p 413**
Device operates in supersonic and hypersonic wind tunnels at temperatures of 700 to 760 C

B76-10380
VELOCITY SENSOR FOR SLOW FLOWS
W E Simon (Martin Marietta Corp)
Jan 1977
LANGLEY-11785 **Vol 1, No 3, p 414**
Inexpensive, easily-constructed device measures flows from 0 2 to 20 feet per second Instrument is capable of measuring flow velocity and direction in cases where either velocity or density is so low that dynamic pressure is below measurable range It can be made into hand held instrument for measuring ventilation and air conditioning flow

B76-10381
IMPROVED GAS-PRESSURE TRANSDUCER
J Dimeff
Jan 1977 See also B72-10198 B74-10243 B75-10082
ARC-10639 **Vol 1, No 3, p 415**
Optically-selective acoustically-resonant, gas-detecting device is used to measure intensity of radiation-induced pressure variations Use of diaphragm improves sensitivity and immunity to background noise

B76-10382
CONTAMINATION MONITORING OF FLUIDS
R D Bonnell (South Carolina Univ) R O Pettus (South Carolina Univ), C A Rhodes (South Carolina Univ) and I F Stowers (South Carolina Univ)
Jan 1977
KSC-11037 **Vol 1, No 3, p 416**
Electro-optical device, consisting of laser and photodiodes is adaptable to processing industries, pollution control, medical technology and food technology

B76-10383
DESIGN OF REDUNDANT SYSTEMS
L F Doty (Honeywell, Inc)
Jan 1977
MSC-16026 **Vol 1, No 3, p 417**
Algorithmic approach is useful for analysis of systems with noisy inputs and when outputs are required in terms of statistical quantities and probabilities of signal excursions beyond desired levels Procedure can be used with circuits chemical processes, material design and other systems with known transfer functions and parameter tolerances

B76-10384
SUBLIMATOR/EVAPORATOR HEAT SINK
B W Webbon
Jan 1977
ARC-10912 **Vol 1, No 3, p 418**
Economical self-regulating device cools liquids by evaporating portion of liquid through porous tubes Technique is characterized by high heat transfer rate and structural simplicity

B76-10385
LOW-ONSET-RATE ENERGY ABSORBER
W H Keathley and C J Wesselski
Jan 1977 See also NASA-TM-X-64444 (N70-35706)
MSC-12279 **Vol 1, No 3, p 419**
Device controls deceleration rates without amplifying system loads It dissipates energy of motion through friction heat and is 22 times more efficient than automobile brakes

B76-10386
CAPACITIVE SHAFT-ANGLE ENCODER
R J Hruby and R L Wilson
Jan 1977
ARC-10897 **Vol 1, No 3, p 420**
Economical device is less subject to wear than conventional resistive-potentiometer devices

B76-10387
AC ADAPTER FOR FUEL-FLOW SENSOR
L L Millman
Jan 1977
GSFC-12037 **Vol 1, No 3, p 422**
Readily-available fuel meters can be used to aid in fuel oil conservation in homes and commercial buildings Device also includes failure monitor that activates warning light and horn if meter fails

B76-10388
PADDLE-PIN ALINEMENT TEST
D M Gilliam and J A Foster
Jan 1977
KSC-10740 **Vol 1, No 3, p 423**
Segmented insulated test bar speeds up patch distributor paddle-pin test Device eliminates need to disconnect cables or remove distributor Printed circuit cable and connector reduces weight on bar, adding to tester portability

B76-10389
ATMOSPHERE-GENERATING SYSTEM
R E Mahan (Lockheed Missiles and Space Co) P A Wagner (Lockheed Missiles and Space Co), and W J Conner (Fluid Dyn Corp)
Jan 1977 See also NASA-CR-134390 (N74-31581)
MSC-14713 **Vol 1, No 3, p 424**
Electrolytic conversion of hydrazine and water in low-pressure tanks to life-support atmosphere requires lighter weight equipment than high-pressure or cryogenic storage techniques

B76-10390
MANUAL TRASH COMPACTOR
G E Stevenson (Nelson and Johnson Eng, Inc)
Jan 1977
MSC-16039 **Vol 1, No 3, p 426**
Device eliminates need for individual refuse bags and disposal containers and may prove less expensive to manufacture and use than powered compactors Instrument has compressive force of 2 000 pounds

B76-10391
TIME-DOMAIN AIRCRAFT MODEL
D K Scharmack (Honeywell, Inc)
Jan 1977
MSC-16018 **Vol 1, No 3, p 427**
Fourier transformation improves aerodynamic coefficients

B76-10392
FUNDAMENTALS OF FLUID SEALING
J Zuk
Jan 1977 See also NASA-TM-X-71851 (N76-17399) NASA-TN-D-8151 (N76-19462)
LEWIS-12683 **Vol 1, No 3, p 427**
Textbook covers fundamentals of fluid sealing Included are seal performance parameters and seal operating regimes

B76-10393
ASTRONAUTIC STRUCTURES MANUAL
Innovator not given Jan 1977
M-FS-23547 **Vol 1, No 3, p 427**
Three-volume reference work serves as catalog of analysis techniques for elastic and inelastic stress ranges and as source on background and development of methods Information is condensation of published journal articles, industry and university publications, textbooks and government documents

B76-10394
CAVITATING PERFORMANCE OF PUMPING MACHINERY
J Hord (NBS), L M Anderson (NBS) and W J Hall (NBS)

Jan 1977 See also NASA-CR-2054 (N72-24363), NASA-CR-2156 (N73-16255) NASA-CR-2242 (N73-28153), NASA-CR-2448 (N74-34704)
LEWIS-12423 **Vol 1, No 3, p 428**
Four-volume publication contains extensive cavitation data and simplified technique for predicting cavitation performance of pumps

B76-10395
SOLAR HEATED AND COOLED OFFICE BUILDING
W L Maag
Jan 1977 See also NASA-TM-X-71615 (N74-34541)
LEWIS-12512 **Vol 1, No 3, p 429**
Installation at NASA Langley Research Center Hampton, Virginia, serves as full-scale working test-bed facility to test flat-plate solar-energy collector systems

B76-10396
GEODYN ORBITAL AND GEODETIC PARAMETER ESTIMATION
B Putney
Jan 1977
GSFC-12014 **Vol 1, No 3, p 429**
Computer program is capable of calculating orbit and geodetic parameter estimates Program can also be used for translunar and interplanetary trajectories

B76-10397
AIR-CUSHION LANDING SYSTEMS
K M Captain (Foster-Miller Associates Inc) A Boghani (Foster-Miller Associates, Inc) and D N Wormley (Foster-Miller Associates, Inc)
Jan 1977
LANGLEY-11783 **Vol 1, No 3, p 430**
Computer program based on heave/pitch analysis simulates dynamic behavior during landing impact and taxi over irregular runway Program can be adapted to run on any computer with FORTRAN compiler

B76-10398
ANALYSIS OF AXISYMMETRIC SHELL STRUCTURE
W B Stephens, G A Cohen (Structures Res Associates), and R T Haftak (Structures Res Associates)
Jan 1977
LANGLEY-12059 **Vol 1, No 3, p 430**
Six compatible computer programs analyze stress vibration and buckling characteristics of general shells of revolution

B76-10399
SPAR STRUCTURAL-PERFORMANCE ANALYSIS AND REDESIGN
W D Whetstone (Lockheed Missiles and Space Co) and L. Kiefling
Jan 1977
LANGLEY-12062, M-FS-23182 **Vol 1, No 3, p 431**
System of processor programs performs stress buckling, and vibrational analysis of large linear finite element systems in excess of 50 000 degrees of freedom, while minimizing processing cost execution time, central memory storage, and secondary data storage requirements Programs use sparse matrix solution techniques and other computational and data management procedures

B76-10400
MATH MODEL OF 3-D AIRCRAFT CONFIGURATION
C B Craidon
Jan 1977
LANGLEY-12029 **Vol 1, No 3, p 432**
Computer program can be used to construct surface equations for aircraft configurations Geometry input section can be replaced to adapt program to any three-dimensional object or objects

B76-10401
TRANSIENT THERMAL ANALYSIS OF FLUID SYSTEMS
G D Chandler (Rockwell Intern Corp) and R D Trust (Rockwell Intern Corp)
Jan 1977
MSC-19502 **Vol 1, No 3, p 433**
Computer program performs transient thermal analysis of any 2-node to 200-node-thermal network, which transports heat by fluid flow convection Program can be modified to add conduction along tubes and radiation

B76-10402
DETERMINING AIRCRAFT STABILITY AND CONTROL DERIVATIVES
K W Iliff and R E Maine
Jan 1977
FRC-10109 **Vol 1, No 3, p 433**
System of three computer programs determines stability and control derivatives from flight data

B76-10403
SWEPT WING AERODYNAMICS
F A Dvorak (Flow Res, Inc) and F A Woodward (Flow Res, Inc)
Jan 1977
ARC-10790 **Vol 1, No 3, p 434**
Technique analyzes viscosity-dependent aerodynamic characteristics of multielement infinite swept wings in incompressible flow Use of source distributions rather than displacement thickness to represent boundary layer effect on potential flow and of iterative technique for matrix inversion reduces computer time for overall analysis

B76-10404
CONTROL SYSTEM DESIGN
R C Seidel and B Lehtinen
Jan 1977
LEWIS-12556 **Vol 1, No 3, p 434**
Computer program optimizes parameters in feedback controller transfer function

B76-10542
INDICATED MEAN-EFFECTIVE PRESSURE INSTRUMENT
W J Rice
Mar 1977
LEWIS-12661 **Vol 1, No 4, p 601**
Device is capable of measuring and calculating IMEP of internal combustion engines in real time Apparatus is used to provide mass flow measurements in engine cylinder and in measurement of release energy of nonlinear spring

B76-10543
PRECISION MEASUREMENT OF CHANGES IN PHYSICAL DIMENSIONS
J W Berthold, III (Arizona Univ), S F Jacobs (Arizona Univ), and M Norton (Arizona Univ)
Mar 1977
M-FS-23527 **Vol 1, No 4, p 602**
Interferometric method is used to measure small changes in size of optical materials Error introduced with optical phase shifts occurring with time is overcome by using parts of Fabry-Perot resonators with unequal lengths Both stability of optical phase shifts upon reflection from multilayer stacks and dimensional stability of optical contacts is measured

B76-10544
AUTOMATED SECONDARY STANDARD FOR LIQUID FLOWMETERS
H F Hobart
Mar 1977 See also NASA-TM-X-71876 (N76-18404)
LEWIS-12695 **Vol 1, No 4, p 603**
Calibration time is reduced from one hour to fifteen minutes Accuracies of flowmeter calibrations are approximately 99 75 percent, using this standard Standard is also used to test or set flow switches

B76-10545
NONDESTRUCTIVE INTERIOR EXAMINATION OF MOVING PARTS
F A Baker (Rockwell Intern Corp)

Mar 1977
M-FS-23378 **Vol 1, No 4, p 604**
Microphone and amplified audio system are used in conjunction with X-ray nondestructive testing to detect foreign particles inside moving hardware when particles cannot be located by X-ray alone

B76-10546
FLANGE WELD PRESSURE TESTING
C F Holden (Rockwell Intern Corp)
Mar 1977
M-FS-19292 **Vol 1, No 4, p 605**
Device allows localized high-pressure proof test Use of tool eliminates need to block off far end of pipe, only small amount of pressurizing gas is needed only small area needs to be cleared of personnel for proof test

B76-10547
ULTRASONIC MONITORING OF CRACK EXTENSION
S J Kliman, D M Fisher, and R J Buzzard
Mar 1977 See also NASA-TM-X-71754 (N75-30606)
LEWIS-12632 **Vol 1, No 4, p 605**
System consisting of commercial ultrasonic flaw detector with transducer clamped to specimen and x-yy' recorder provides permanent record of crack extension, resulting in clear indication of onset of cracking that is relatively insensitive to plastic deformation

B76-10548
MECHANICAL LOADER FOR TESTING COMPOSITES
I M Daniel (IIT Res Inst) and T Liber (IIT Res Inst)
Mar 1977 See also NASA-CR-134826 (N75-30264)
LEWIS-12432 **Vol 1, No 4, p 606**
Device applies constant preload to environmentally cycled specimens Loading spring for each specimen has sufficiently large deflection to insure insignificant degree of change in specimen load during thermal cycling

B76-10549
THERMAL/VACUUM TESTING OF LASER CORNER-CUBE RETROREFLECTORS
Innovator not given (Bendix Corp) Mar 1977
M-FS-23565 **Vol 1, No 4, p 608**
Test procedure for optimum cube design records beam-return patterns photographically

B76-10550
ACOUSTIC TESTING OF MATERIALS
Innovator not given (Bolt, Beranek, and Newman, Inc) Mar 1977
LANGLEY-11659 **Vol 1, No 4, p 609**
Sound-absorption coefficients are measured with or without anechoic chamber

B76-10551
LEAK TESTING GLASS AMPOULES
B J Kallman (TRW, Inc)
Mar 1977
LANGLEY-11988 **Vol 1, No 4, p 610**
Test sensitivity is enhanced by using mass spectrometer

B76-10552
DETECTING CONTAMINATION ON A METAL SURFACE
J M Harris (Rockwell Intern Corp), H L Marcus (Rockwell Intern Corp) and T Smith (Rockwell Intern Corp)
Mar 1977
M-FS-19260 **Vol 1, No 4, p 610**
Thin layers of contaminant on metal surface are detected by measuring surface-potential difference between reference electrode and surface of interest Procedure does not require mechanical contact with surface under examination

B76-10553
DETECTION OF SURFACE IMPURITIES ON PROCESSED METALS
J V Kenkel (Rockwell Intern Corp), F B Mansfeld (Rockwell Intern Corp), H L Marcus (Rockwell Intern Corp), and N E Paton (Rockwell Intern Corp)
Mar 1977
MSC-19670 **Vol 1, No 4, p 611**
Method is based on measurements of electrical conductivity through layer of distilled water that has been deposited on metal surface Conductivity is measured for 15-30 minute period, which is sufficient time to allow surface impurities to dissolve in water

B76-10554
HEAT-TRANSFER COEFFICIENTS OF PIN-FINNED CYLINDERS
G J VanFossen, Jr
Mar 1977 See also NASA-TM-X-3173 (N75-14990)
LEWIS-12557 **Vol 1, No 4, p 612**
Pin-finned cylinder can increase heat-transfer rate to more than 4 times that of plain cylinder, depending on pin diameter and spacing Smallest diameter, closest spacing, and largest pin length-to-diameter ratio gives highest average effective heat-transfer coefficients

B76-10555
MINIATURE-ANGULAR-POSITION TRANSDUCER
D L Gray and M C Sandford
Mar 1977
LANGLEY-11999 **Vol 1, No 4, p 613**
Simple and inexpensive device using solar cells, measures rapidly-responding active control surfaces of aeroelastically-scaled wind-tunnel models of aircraft Device allows control surfaces to be measured to within 0 10 deg

B76-10556
ONE-WIRE THERMOCOUPLE
W D Goodrich and C J Stalmach (LTV Aerospace Corp)
Mar 1977 See also B76-10593, NASA-CR-144364 (N75-29356)
MSC-16220 **Vol 1, No 4, p 614**
Nickel alloy/constantan device accurately measures surface temperature at precise locations Device is moderate in cost and simplifies fabrication of highly-instrumented seamless-surface heat-transfer models Device also applies to metal surfaces if constantan wire has insulative coat

B76-10557
PULSE DETECTOR
N E Simmons (Rockwell Intern Corp)
Mar 1977
MSC-16268 **Vol 1, No 4, p 615**
Simple device spots opens and shorts during shock and vibration testing Device has excellent temperature stability and consistent timing accuracy Range of detected pulse widths, or time intervals is adjustable

B76-10558
HYDRODYNAMIC LUBRICATION OF FACE SEALS
L P Ludwig and G P Allen
Mar 1977 See also NASA-TN-D-8101 (N76-21560), NASA-TN-D-8102 (N76-20484)
LEWIS-12710 **Vol 1, No 4, p 616**
Two companion reports describe possible primary-seal geometries and face-seal angular-misalinement geometry

B76-10559
IMPACT RESPONSE ANALYSES
C S Bodley (Martin Marietta Corp), D M Warner (Martin Marietta Corp), and A C Park (Martin Marietta Corp)
Mar 1977
M-FS-23335 **Vol 1, No 4, p 617**
General-purpose computer program establishes dynamic response of two impacting elastic bodies each containing linear or nonlinear impact attenuation mechanism Program can be used for analysis of broad spectrum of impact motion response investigations

B76-10560
IMPACT OF A SOLID BODY WITH WATER

D A Kross C M Bishop (Boeing Co) B E Clingan (Boeing Co) J R Colson (Boeing Co), C J Heffron (Boeing Co), and C Wiser (Boeing Co)
Mar 1977
M-FS-23512 **Vol 1, No 4, p 617**
Rigid body three-degrees-freedom, digital-simulation program calculates dynamics and loads

B76-10561
DESIGN ANALYSIS OF RADIAL-INFLOW TURBINES
A J Glassman
Mar 1977
LEWIS-12684 **Vol 1, No 4, p 618**
Computer program performs velocity-diagram analysis required for determining geometry and estimating performance for radial-inflow turbines

B76-10562
THERMAL-RADIATION MODEL
W C Claunch G H Watson (Lockheed Missiles and Space Co) and A L Lee (Lockheed Missiles and Space Co)
Mar 1977
M-FS-23538 **Vol 1, No 4, p 618**
Central Cartesian coordinate system calculates thermal environment around rocket plume Radiative heat exchange between surfaces is calculated by Monte Carlo method

B76-10563
GENERAL INSTABILITY ANALYSIS
C J Bianca, A A Holston, Jr (Martin Marietta Corp) J R Lager (Martin Marietta Corp) and J M Toth, Jr (Martin Marietta Corp)
Mar 1977
M-FS-23407 **Vol 1, No 4, p 619**
HOLBOAT computer program provides instability analysis of inhomogeneous, anisotropic right-circular cylinder or segment under combined loading Program is based on Kirchhoff-Love hypothesis general anisotropic constitutive equations and Flugge s differential equations of equilibrium

B76-10564
TRANSPOSE OF FINITE-ELEMENT DATA
T Furuike (Rockwell Intern Corp)
Mar 1977
MSC-19644 **Vol 1, No 4, p 619**
TRANSPOSE computer program examines single point of structural-analysis model under many loads Program helps in data reduction and analysis saves output for subsequent postprocessing, and reduces time required for structure analysis Essentially program transposes finite-element data from one loading condition for all element and node data to one-node-point data for all loading conditions

B76-10565
ESTIMATING SUBSONIC AERODYNAMIC CHARACTERISTICS OF COMPLEX PLANFORMS
J E Lamar R J Margason and B B Gloss
Mar 1977
LANGLEY-11047 **Vol 1, No 4, p 619**
Vortex-lattice FORTRAN program estimates subsonic aerodynamic characteristics of complex planforms and interacting lifting surfaces with separated flow around sharp edges

B76-10566
TRIMMED NONCOPLANAR PLANFORMS WITH MINIMUM VORTEX DRAG
J E Lamar
Mar 1977
LANGLEY-12121 **Vol 1, No 4, p 620**
Vortex-lattice subsonic method determines mean camber surface for trimmed noncoplanar planforms with minimum vortex drag Multiple surfaces can be designed together to yield trimmed configuration with minimum induced drag at some specified lift coefficient Program is applicable to isolated wings, wing-canard configuration tandem wing and wing-winglet configuration

B76-10567
ESTIMATING AIRCRAFT STATES
R C Wingrove
Mar 1977
ARC-10969 **Vol 1, No 4, p 620**
Computer program provides weighted least-squares estimates of aircraft states from measurements recorded during routine flight tests Program contains standard six-degree-of-freedom kinematic equations

B76-10568
STABILITY OF AN ELASTIC AIRPLANE
L L Erickson, P P Polentz A Dusto (Boeing Co) G Hink (Boeing Co), and S Shansen (Boeing Co)
Mar 1977
ARC-11086 **Vol 1, No 4, p 621**
FLEXSTAB computer program is used to evaluate trim state static and dynamic stability characteristics, inertial and aerodynamic loading, and elastic deformations of aircraft configurations at subsonic and supersonic speeds

B76-10569
INDEPENDENT TRAJECTORY DETERMINATION SYSTEM
M G Armstrong and I B Tomaszewski
Mar 1977
GSFC-11923 **Vol 1, No 4, p 621**
Stand-alone subsystem calculates flight data analytically or numerically System is orbit ephemeris generation program and is subsystem of comprehensive Goddard Trajectory Determination System (GTDS)

07 MACHINERY

B76-10114
CONCENTRIC-TUBE DIFFERENTIAL DRIVE
R E Marlow (Sperry Rand Corp)
Mar 1976
M-FS-22707 **Vol 1, No 1, p 115**
Remote manipulator consists essentially of gear shafts that are placed concentrically with bevel gears located at each joint Teleoperator s advantages include light weight accessibility of parts, continuous rotation of joints, possibility of underwater use, and possibility of miniaturization

B76-10115
IMPROVED AUTOMOBILE GAS TURBINE ENGINE
M G Kofskey T Katsanis, R J Roelke K L McLallin R Y Wong L F Schumann (USAAMRDL) and M R Galvas (USAAMRDL)
Mar 1976 See also NASA-TM-X-71714 (N75-24106) NASA-TM-X-71717 (N75-21633) NASA-TM-X-71719 (N75-24116)
LEWIS-12521 **Vol 1, No 1, p 116**
Upgraded engine delivers 100 hp in 3500 lb vehicle Improved fuel economy is due to combined effects of reduced weight reduced power-to-weight ratio increased turbine inlet pressure and improved component efficiencies at part power

B76-10116
EFFICIENT LOW STATIC-VOLUME WATER HEATER
R L Brown
Mar 1976
M-FS-22469 **Vol 1, No 1, p 117**
Calrod heating element is surrounded by matrix of fused sintered copper or brass balls and assembly is then installed in piping of water system As water flows through matrix, sintered balls cause turbulent flow and heating Applications include laundromats laboratories and photographic labs

B76-10117
CYCLICAL BIODIRECTIONAL ROTARY ACTUATOR
W C Stange
Mar 1976
GSFC-11883, GSFC-11974, GSFC-11975 **Vol 1, No 1, p 118**
Thermally powered device flips magnetometer between one of two positions located 180 deg apart and permits instrument calibration Pair of heat-extensible springs selectively rotate shaft from one position to other when electric heaters bonded to them are energized

B76-10118
FIELD SAMPLING FINE-VACUUM SYSTEM
E W Fickey (Bendix Corp) and D M Smoot (Bendix Corp)
Mar 1976
KSC-10596 **Vol 1, No 1, p 119**
Small portable pumping station, consisting of roughing pump air cooled diffusion pump, and liquid nitrogen cold trap, permits onsite sampling followed by quantitative laboratory analysis of residual gases

B76-10119
INTEGRAL FAN/WATER SEPARATOR
R L Johnson (Garrett Corp)
Mar 1976
MSC-14756 **Vol 1, No 1, p 120**
Centrifugal force created by rotating fan wheel separates moisture from gas Lightweight portable unit can be worn with pressurized suit where it will remove moisture that accumulates from breathing and perspiration

B76-10120
CROSSWIND LANDING-GEAR POSITION INDICATOR
R A Champine
Mar 1976
LANGLEY-11941 **Vol 1, No 1, p 121**
Position indicator for airplanes equipped with adjustable or automatic crosswind landing-gear systems prevents wheel misalinements

B76-10121
POINTING CONTROL/ROLL POSITIONING MECHANISM
W E Kohman (Perkin-Elmer Corp)
Mar 1976
M-FS-22809 **Vol 1, No 1, p 122**
Telescope mount provides torquing for a fine-pointing servosystem in both pitch and yaw Use of flexure bearings in EPC (experiment pointing control) actuator package offers performance and reliability superior to that of other bearing configurations

B76-10122
HAND FIN FOR SWIMMING
H L Martin
Jun 1977
M-FS-21632 **Vol 1, No 1, p 123**
Paddle mounted on forearm aids propulsion and maneuverability and frees hand for work without interference

B76-10244
TOOL REMOVES BRAZED FITTINGS
W J Hurley (Martin Marietta Corp) and S E Nelson (Martin Marietta Corp)
Aug 1976
LANGLEY-10944 **Vol 1, No 2, p 253**
Device which removes fittings from thin-walled tubing will not accidentally bond to fitting, nor will it cause tube wall to melt Key feature is the use of expendable split-ring heat sink insert Technique is applicable to fitting stubs of all sizes and wall thicknesses

B76-10245
MECHANICAL POSITIONER
G A Tuthill (Rockwell Intern Corp) and G O Magnusson (Rockwell Intern Corp)
Aug 1976
MSC-15817 **Vol 1, No 2, p 254**
Manually controlled positioner designed for castor wheels on heavy equipment employs self-engaging self-releasing friction cam that engages with and moves wheel Adjustable stops control degree of pressure exerted on wheel, and lock pin holds device in neutral steering configuration

B76-10246
RADIAL LEVEL
D L Posey
Aug 1976
LANGLEY-11982 **Vol 1, No 2, p 255**
Actual angle indicator is a liquid captured inside cylindrical transparent tube that is radially mounted around or under 360 deg scale Device is functional and accurate within full 360 deg spectrum and instantly determines any surface angle without making adjustments since it has no moving parts

B76-10247
SPLIT-RING SEAL
E A Gallo (Kentron Hawaii Ltd)
Aug 1976
MSC-14304 **Vol 1, No 2, p 256**
Gland-type seal may be used with hydraulic and pneumatic actuators and similar equipment It is designed for applications with partial vacuums and requires little space for installation and infrequent servicing

B76-10248
ROTARY BROACHES
C Libertone (Rockwell Intern Corp)
Aug 1976
M-FS-23374 **Vol 1, No 2, p 257**
Tool is used for counterboring or backspot facing recesses for boltheads or nuts in difficult-to-reach locations, such as near webs bosses or flanges Two versions of tool have been designed, one for roughing out and another for finishing

B76-10249
VEHICLE LOAD-EQUALIZATION SYSTEM
W K Creasy
Aug 1976
MSC-12466 **Vol 1, No 2, p 258**
System uses cables and associated pulleys to form closed-loop suspension system for terrain compensation Loop causes reactions at each of three wheels in response to loading at remaining wheel Simplicity of design should be of interest to designers and manufacturers of construction equipment and off-road vehicles

B76-10250
LARGE-DIAMETER FASTENERS OF CRES ALLOY
J F Charles (Rockwell Intern Corp) and M L Marke (Rockwell Intern Corp)
Aug 1976
MSC-19313 **Vol 1, No 2, p 259**
Double-hex bolthead allows bolts of high strength corrosion-resistant steel (CRES) to be made in diameters up to 1-1/4 in Design allows 12-point tension heads to be cold formed to retain required minimum tensile strength of 220 000 psi and to retain high fracture strength

B76-10251
HIGH-TEMPERATURE HEATING ARRAY
H E Christensen (McDonnell-Douglas Corp) and B G Cox *(McDonnell-Douglas Corp)*
Aug 1976
MSC-14287 **Vol 1, No 2, p 260**
Heating array for thermally conditioning reusable surface insulation panels of thermal protection systems is capable of heating samples to 2500 F at pressures ranging from 0 5 to 760 torr System uses low cost, easily replaceable graphite heating elements which give more uniform heating than quartz lamps

B76-10252
LOAD-REGULATING LATCH

W T Appleberry (Rockwell Intern Corp)
Aug 1976
MSC-19535 **Vol 1, No 2, p 261**
Device is designed for remotely latched doors or for doors on which latch cannot be reached for adjustment after door is closed It automatically regulates latch tension load prevents overload and load shares in multiple latch system

B76-10253
SOLAR CONCENTRATOR/ABSORBER
G F VonTiesenhausen
Aug 1976
M-FS-23428 **Vol 1, No 2, p 262**
Collector/energy converter consisting of dual-slope optical concentrator and counterflow thermal energy absorber is attached to multiaxis support structure Efficient over wide range of illumination levels device may be used to generate high temperature steam serve as solar powered dryer or power absorption cycle cooler

B76-10254
PROPOSED LOW-TEMPERATURE SOLAR ENGINE
J A Peoples and G B Kearns
Aug 1976
M-FS-23403 **Vol 1, No 2, p 263**
Engine, proposed for conversion of Sun s heat to motion without need for heat pumps and associated equipment uses expansion and contraction of aluminum rod to drive tow out-of-phase windlasses Linear displacement of 0 076 cm in rod will exert sufficient force to drive pumps generators and compressors

B76-10255
CONICAL DIFFUSER FOR FUEL CELLS
D W Craft (GE)
Aug 1976
MSC-14026 **Vol 1, No 2, p 264**
Diffuser is inserted into inlet manifold, producing smooth transition of flow from pipe diameter to manifold diameter Expected pressure gradient and resulting cell-to-cell temperature gradient are reduced Outlet manifold has nozzle insert that reduces exit losses

B76-10256
HORIZONTALLY-MOUNTED SOLAR COLLECTOR
D H Black
Aug 1976
M-FS-23349 **Vol 1, No 2, p 265**
System consists of three major components vertical deflector assembly, stationary reflector and motor driven tracking mechanism Deflector assembly directs incident incoming energy to a vertical direction, using series of horizontally mounted vanes Energy is then redirected via reflector to fixed collector

B76-10257
HAND AND POWER TOOLS
Innovator not given Aug 1976 See also NASA-SP-5976(06)
HQN-10892 **Vol 1, No 2, p 266**
Report contains descriptions of twenty-five tools and tooling advancements developed for industrial and small machine shop adaptation

B76-10405
HIGH-TORQUE OPEN-END WRENCH
H Behimer J M Dame and A Giandomenico
Jan 1977
NPO-13541 **Vol 1, No 3, p 437**
Two-element tool is designed for tightening closely-spaced nuts on adjacent tubing

B76-10406
FRAME FOR DAYLIGHT PHOTOCOPYING
J W Dalton
Jan 1977
KSC-11026 **Vol 1, No 3, p 438**
Inexpensive fixture makes quick copy of picture or photograph film positive or negative without darkroom Device holds four-by-five inch instant-developing Polaroid 58 or 55 (or equivalent) film

B76-10407
SLOTTED BOLTS AND STUDS FOR VACUUM SYSTEMS
F E Zellner
Jan 1977
LEWIS-10391 **Vol 1, No 3, p 439**
Modified device reduces outgassing from installed fixtures

B76-10408
SOFT SEAT A-N FITTING FOR VACUUM USE
A B Szuhai
Jan 1977
LEWIS-10130 **Vol 1, No 3, p 439**
Commercially available fittings are modified to produce leaktight connections at low cost

B76-10409
PRECISION CENTERING VISE
J A Thompson (Bendix Corp)
Jan 1977
KSC-11041 **Vol 1, No 3, p 440**
Lightweight device automatically aligns stainless-steel tubing and fittings regardless of differing diameters prior to joining via induction brazing Device is useful in remote areas where existing supports or walls cannot be used to anchor tubing holder

B76-10410
SUSTAINED-ARC IGNITION SYSTEM
A G Birchenough
Jan 1977
LEWIS-12444 **Vol 1, No 3, p 440**
Process results in long-duration sparks which allow leaner cleaner combustion Procedure is not limited by available energy-storage devices and can produce continuous spark of as long duration as desired for optimum engine operation and pollution reduction System can be modified to operate on engines not using distributor points and can be used with conventional Kettering ignitions

B76-10411
POWERED WHEEL FOR AIRCRAFT
M J Long S C Irick and R K VanAusdal (Bendix Corp)
Jan 1977 See also B75-10258
LANGLEY-12053 **Vol 1, No 3, p 441**
Single integral unit includes motor gearbox, and clutch Device has two-speed capability, fits within aerodynamic contours of aircraft, operates with onboard power source, does not interfere with normal landing gear functions, reduces use of regular brakes in congested areas and provides locomotion and supplementary braking capability

B76-10412
SAFETY BRAKE FOR TAPE REELS
C E Carle
Jan 1977
GSFC-11960 **Vol 1, No 3, p 442**
All-mechanical device senses end of tape and stops reel, even in event of electronic system failure Assembly includes stop to prevent brake from overriding tape Recentering mechanism returns brake to neutral position after torque is removed from reels

B76-10413
IMPROVED ROAD HANDLER
P H Broussard, Jr J L Burch and C Mueller
Jan 1977
M-FS-23233 **Vol 1, No 3, p 443**
Rope-and-pulley device unwinds at rate fairly independent of weight attached to it Device is easily installed and fabrication is economical It is particularly suitable as emergency escape device

B76-10414
DOOR LATCH WITH THROUGH-ACCESS HOLE
W F Dixon ((Rockwell Intern Corp), R P Pritchard (Rockwell Intern Corp), and R E Woodfill (Rockwell Intern Corp)
Jan 1977
MSC-19634 **Vol 1, No 3, p 444**
Innovation allows fully-loaded container to be fastened to rear wall of recessed area Assembly is designed to carry shear and tension loads Retractable handle allows for visual verification if door is locked or unlocked

B76-10415
GAS BOOST COMPRESSOR
L S Terp (Garrett Corp)
Jan 1977
MSC-14757 **Vol 1, No 3, p 445**
Device, driven by low pressure gas supply, requires fewer controls and valves than conventional devices Device can boost compression four times initial pressure

B76-10416
DYNAMIC LOAD ATTENUATOR
P N Crum (Rockwell Intern Corp)
Jan 1977
MSC-17472 **Vol 1, No 3, p 446**
Instrument consists of special bolt head that cuts material from splined washer Required shear and tensile forces absorb kinetic energy Cut-away material is retained by shearing action making device useful where production of loose metal particles is not acceptable

B76-10417
SPIN-RATE CONTROL DEVICE
L J Nolte (Hughes Aircraft Co)
Jan 1977
ARC-10884 **Vol 1, No 3, p 446**
Innovation eliminates need for driver sensor and interconnecting logic circuits Device combines simplicity of fixed-fin concept with precise rate control provided by active flight control system

B76-10418
HEAVY-DUTY MECHANICAL SEQUENCER
W T Appleberry (Rockwell Intern Corp)
Jan 1977
MSC-19536 **Vol 1, No 3, p 448**
Modular sequential mechanism allows output stroke angle and location of start/stop points to be pre-programmed Output torques are higher than typical Geneva mechanisms are constant throughout cycle, and have a moment equal to that of power source

B76-10419
ENERGY-ABSORBING ATTENUATOR
P Galovich (Rockwell Intern Corp) and J C Wilkowski (Rockwell Intern Corp)
Jan 1977
MSC-17473 **Vol 1, No 3, p 449**
Simple inexpensive one-shot load device uses thin-walled soft-metal tube to absorb kinetic energy by controlled buckling

B76-10420
JET ENGINE STATOR-BLADE REMOVAL TOOL
D D Diamond (Serv-Air, Inc)
Jan 1977
MSC-16000 **Vol 1, No 3, p 450**
Instrument removes individual stator-blade segments from J-85 jet engine without deforming blade or engine casing

B76-10570
NASA TECHNOLOGY UTILIZATION HOUSE
Innovator not given Mar 1977
LANGLEY-12134 **Vol 1, No 4, p 625**
Following systems and features which are predicted to save approximately $20,000 in utility costs over twenty year period are incorporated into single-level contemporarily designed energy efficient residential structure solar heating and cooling energy efficient appliances water recycling security, smoke and tornado detectors, and flat conductor electrical wiring

B76-10571
ECONOMICAL SOLAR-HEATING FOR HOMES
J W Allred J M Shinn, Jr C E Kirby and S R Barringer
Mar 1977 See also NASA-TM-X-3294 (N76-27671)
LANGLEY-12135 **Vol 1, No 4, p 626**
Do-it-yourself supplementary solar-heating system is available for purchase at approximately $2 000 Report describes design, construction testing and economic analysis of low-cost solar heating system

B76-10572
LEVELING APPARATUS FOR PRECISION INSTRUMENTS
R W Delaplaine and D L Ossolani
Mar 1977
ARC-10981 **Vol 1, No 4, p 627**
Simple inexpensively-constructed device provides shock-and-vibration-resistant support

B76-10573
LOW-PRESSURE-GAS SAMPLING PUMP
P L Fontecchio (Metal Bellows Corp)
Mar 1977
ARC-10941 **Vol 1, No 4, p 628**
Bellows pump raises sampled-gas pressure to level compatible with available compressors

B76-10574
DISPENSING A MEASURED QUANTITY OF A LIQUID
T A Cook (McDonnell-Douglas Corp) and H Cheibe (McDonnell-Douglas Corp)
Mar 1977
M-FS-21163 **Vol 1, No 4, p 629**
Hand-held pushbutton-controlled dispenser ejects predetermined amount of fluid Each cycle is recorded on counter All seals in contact with cooler are food grade No maintenance is required during life of unit

B76-10575
OMNIDIRECTIONAL WHEEL
J F Blumrich
Mar 1977
M-FS-21309 **Vol 1, No 4, p 630**
Device with rotating rim elements provides mobility in any direction for ground vehicle without requiring change of orientation relative to vehicle

B76-10576
LONG-LIFE BALL-VALVE DESIGN
D F Ferris (Rockwell Intern Corp) and W A Gillon, Jr (Rockwell Intern Corp)
Mar 1977
M-FS-19282 **Vol 1, No 4, p 631**
Eccentric mounting of ball on stem reduces wear on valve seal

B76-10577
RECORDING-TAPE POSITION SENSOR
G C Schoppet
Mar 1977
GSFC-12056 **Vol 1, No 4, p 631**
Device uses tachometer pulses from capstan and reset pulse from one reel to sense count of tach pulses per revolution of reel Number of pulses is direct measurement of tape stack radius and is independent of tape speed or direction

B76-10578
IMPROVED SHELF FOR ELECTRONIC MODULES
R A Marzek
Mar 1977
NPO-13158 **Vol 1, No 4, p 632**
Self-aligning slide assembly improves air flow Alinement accuracy is incorporated into assembly at time of fabrication

reducing requirement for mounting-hole location accuracy Amount of labor needed for installation necessary machining hardware, and number of mounting points are reduced from previous support system Load-bearing capability is built into mounting platform

08 FABRICATION TECHNOLOGY

B76-10123
LOW-COST SOLAR REFLECTORS
M J Argoud J Jolley, and W L Walker
Mar 1976
NPO-13707 **Vol 1, No 1, p 125**
Foamed glass provides an inexpensive lightweight substrate for reflective elements used in solar energy converters Material withstands temperature from -450 to 800 degrees Fahrenheit and pressures up to 100 psi

B76-10124
BATTERY-CELL THERMAL TEST FACILITY
J A Sanders (Martin Marietta Corp)
Mar 1976
M-FS-23040 **Vol 1, No 1, p 126**
Vacuum-enclosed system is used to analyze instantaneous thermal and electrical characteristics of batteries Data can be used to determine efficiency and provide for more effective utilization of available power

B76-10125
UNIFORM SOLAR CELLS
Innovator not given (Northrop Serv, Inc) Mar 1976
GSFC-11941 **Vol 1, No 1, p 127**
Solar cells used in radiation sensors can be efficiently matched by individual trimming Strip of aluminized Mylar is used to adjust cell output to within required tolerances Method is faster than individual selection of matched cells

B76-10126
STOPPING SMALL LIQUID LEAKS
C R Gilley (Boeing Co) and J R Schanbacher (Boeing Co)
Mar 1976
KSC-10667 **Vol 1, No 1, p 127**
Technique helps locate minute liquid leaks in fittings of petroleum-base fuels

B76-10127
COMBINED JOINING PROCESS FOR DISSIMILAR METALS A CONCEPT
C S Beuyukian (Rockwell Intern Corp) and M J Mitchell (Rockwell Intern Corp)
Mar 1976
MSC-19323 **Vol 1, No 1, p 128**
Combined brazing and diffusion bonding process for aluminum and stainless steel saves time and simplifies processing Tests show that resulting bond can withstand internal pressures up to 1 000 psi

B76-10128
NONDESTRUCTIVE INSPECTION OF MULTILAYERED INSULATION
J A Zelik (McDonnell-Douglas Corp)
Mar 1976
M-FS-22191 **Vol 1, No 1, p 129**
Radio frequency techniques are used to evaluate multilayered cryogenic insulation Electromagnetic inspection approach assesses metal loss and layer density

B76-10129
RELIABILITY OF HYBRID MICROCIRCUIT BONDING
S V Caruso D L Kinser S M Graff and R V Allen
Mar 1976
M-FS-23358 **Vol 1, No 1, p 130**
Microcircuit failure due to differential thermal expansion depends on technique used to mount components to substrate Effects of differential thermal expansion on ceramic chip capacitors are investigated for various bonding techniques

B76-10130
ROLL-FORMING TUBES TO HEADER PLATES
K Kramer
Mar 1976
LEWIS-10513 **Vol 1, No 1, p 131**
Technique has been developed for attaching and sealing tubes to header plates using a unique roll-forming tool Technique is useful for attaching small tubes which are difficult to roll into conventional grooves in header plate tube holes and for attaching when welding brazing, or soldering is not desirable

B76-10131
METAL STRUCTURES WITH PARALLEL PORES
J M Sherfey
Mar 1976
GSFC-10984 **Vol 1, No 1, p 132**
Four methods of fabricating metal plates having uniformly sized parallel pores are studied elongate bundle wind and sinter extrude and sinter and corrugate stack Such plates are suitable for electrodes for electrochemical and fuel cells

B76-10132
METALWORKING METHOD FOR COMPOSITES
A P Divecha (Commonwealth Sci Corp)
Mar 1976
M-FS-23354 **Vol 1, No 1, p 133**
Effective fabrication methods for aluminum/boron and aluminum/graphite composites have been investigated Drawing and rolling were found to be adaptable to Al/B fabrication Although graphite composites are not amenable to standard metal processing methods it may be possible to reduce fabrication costs of Al/C through electron-beam heating

B76-10258
RF SHAPING OF SILICON RIBBON
D A Pelhank (McDonnell-Douglas Corp) R D Rochat (McDonnell-Douglas Corp) and W Marx (McDonnell-Douglas Corp)
Aug 1976
M-FS-23424 **Vol 1, No 2, p 269**
Electromagnetic force generated by radiofrequency coil is used to shape molten silicon Shaping coil surrounds melt near solid-liquid interface and induces current in surface region of melt nearly equal to but opposite coil current

B76-10259
IGFET/SOI FABRICATION METHOD
W R Feltner
Aug 1976
M-FS-23312 **Vol 1, No 2, p 270**
Technique increases switching speeds shortens channel length, reduces parasitic capacitance and gate overlap and minimizes gate-to-channel capacitance The p and n sections may be reversed allowing fabrication of complementary devices

B76-10260
SOLAR CELL ELECTRICAL CONNECTIONS
H S Rauschenbach (TRW Inc) and H G Mesch (TRW Inc)
Aug 1976
LEWIS-12293 **Vol 1, No 2, p 272**
Study was conducted to find best methods of attaching pure silver and silver plated Kovar (trademark) interconnect ribbons to silicon solar cells with titanium-silver solderless contacts Investigations include thermocompression bonding parallel-gap welding and ultrasonic welding

B76-10261
EPITAXIAL GROWTH OF GA1-XALXAS ON GAP
J M Woodall (IBM) and G I Farmer (IBM)
Aug 1976

GSFC-11826 **Vol 1, No 2, p 274**

Technique suitable for monolithic device fabrication methods permits growth of LED structures on GaP substrates by liquid-phase epitaxial method thus obviating needs for growing thick layers and for removing substrates High efficiency infrared LED s can be developed as pumping sources for Nd YAG lasers

B76-10262
METHOD OF REMOVING DRILLING CHIPS
F E Ransom (Rockwell Intern Corp)
Aug 1976
M-FS-19235 **Vol 1, No 2, p 275**

Special chuck directs mixture of pressurized air and water through drill bit thus removing chips during boring of long, large diameter holes

B76-10263
POLISHING GOLD AND GOLD-ALLOY CRYSTALS
J P Doty (Eagle-Picher Ind Inc)
Aug 1976
M-FS-22800 **Vol 1, No 2, p 276**

Sawed cross-section samples are rough polished at minimum pressure with 14 micron grit After saw marks are polished away polishing grit is changed to 0 05 micron When smooth appearance is attained surface is then chemically polished by hand in dust free room

B76-10264
SOLDERING HIGH-IMPEDANCE NICHROME WIRE
M Spruill (Rockwell Intern Corp) and P R Callen (Rockwell Intern Corp)
Aug 1976
M-FS-1457 **Vol 1, No 2, p 276**

Nickel wire segment allows Nichrome wire to be soldered without changing its electrical characteristics

B76-10265
DIFFUSION BRAZING NICKEL-PLATED STAINLESS STEEL
C S Beuyukian (Rockwell Intern Corp) and M J Mitchell (Rockwell Intern Corp)
Aug 1976
MSC-19322 **Vol 1, No 2, p 277**

To bond parts sandwich assembly is made up of aluminum core aluminum face sheet with brazing alloy interface and nickel plated stainless steel part Sandwich is placed between bottom and top glide sheet that is placed in stainless steel retort where assembly is bonded at 580 C

B76-10266
ULTRA-LIGHTWEIGHT PRESSURE VESSELS
W W Schmidt (Brunswick Corp) and R O Hawkins (Brunswick Corp)
Aug 1976
MSC-14983 **Vol 1, No 2, p 278**

Composite tanks fabricated from two metal spheres which are pressure welded and then overwrapped with plastic composite are 66 percent lighter than similar all-metal vessels Overwrap minimizes shrapnel effects shifts failure mode to that of cyclic leakage and withstands minimum burst pressure

B76-10267
STRIPPER FOR SILICONE POLYMERS
B B Williams (Rockwell Intern Corp)
Aug 1976
MSC-19380 **Vol 1, No 2, p 278**

Potassium hydroxide in ethyl alcohol solution can strip away coatings adhesives and encapsulants without damaging substrates

B76-10268
IMPROVED PHOTOCHEMICAL ETCHING OF STAINLESS STEEL
G E Lotgering (Rockwell Intern Corp)
Aug 1976
MSC-19728 **Vol 1, No 2, p 279**

Improved process yields tougher and more adherent coating that withstands longer exposure to acid etch spray without cracking or flaking and permits etching to depth of 0 127 cm

B76-10269
ELECTRON-BEAM WELDER ALINEMENT
E L Whiffen (Rockwell Intern Corp)
Aug 1976
MSC-19642 **Vol 1, No 2, p 279**

Parts are easily and quickly positioned in welding vacuum chamber with use of inexpensive thin metal-foil plate

B76-10270
OVERHEAD TRAY FOR CABLE TEST SYSTEM
K T Saltz (Rockwell Intern Corp)
Aug 1976
MSC-19488 **Vol 1, No 2, p 280**

System consists of overhead slotted tray series of compatible adapter cables, and automatic test set which consists of control console and cable-switching console System reduces hookup time and also reduces cost of fabricating and storing test cables

B76-10271
3-D FOAM ADHESIVE DEPOSITION
C R Lemons (McDonnell-Douglas Corp) and O K Salmassy (McDonnell-Douglas Corp)
Aug 1976
M-FS-22739 **Vol 1, No 2, p 281**

Bonding method which reduces amount and weight of adhesive is applicable to foam-filled honeycomb constructions Novel features of process include temperature-viscosity control and removal of excess adhesive by transfer to cellophane film

B76-10272
SYNCHRONIZED BACKSIDE-WELD FOLLOWER
W F Iceland (Rockwell Intern Corp) and W M Beaupre (Rockwell Intern Corp)
Aug 1976
M-FS-24454 **Vol 1, No 2, p 282**

For curved-path tracking with respect to power input side system employs two sets of infrared detectors on dropthrough side for sensing First set functions with closed-loop motor control system in azimuthal direction and second set with its closed-loop motor control system positions elevation

B76-10273
ABLATIVE-FILLED HONEYCOMB COMPOSITES
H L Linebarier (Martin Marietta Corp)
Aug 1976
LANGLEY-11180 **Vol 1, No 2, p 283**

Two techniques reduce fabrication cost and complexity net surface molding permits ablative insulators with sculptured tapers to be produced over substrate having unpredictable irregularities subsurface molding results in ablative surface below honeycomb

B76-10274
COMPOUND SOLDER JOINTS
R I Batista (TRW Inc) and R B Simonson (TRW Inc)
Aug 1976
LANGLEY-11444 **Vol 1, No 2, p 284**

Joining technique prevents contamination may be used to join dissimilar metal tubes minimizes fluid and gas entrapment expedites repairs and can yield joints having leakage rates less than 0 000001 standard cubic cm He/min Components of joint are solder sleeve two solder rings Teflon sleeve and tubing to be joined

B76-10275
CLEANING CARBON STEEL
V Maynard (Bendix Corp)
Aug 1976
KSC-10689 **Vol 1, No 2, p 285**

Increased etch rate using 8% citric acid actually reduces total amount of material etched away by eliminating reprocessing that was frequently required Time required in citrosolve solution is reduced and more protective passive coating is provided

B76-10276
REPAIR OF FUSED SILICA PLATENS
R M Heisman (Rockwell Intern Corp) and C S Beuyukian (Rockwell Intern Corp)
Aug 1976
MSC-19713 **Vol 1, No 2, p 286**
Refill/leveling technique which consists of spreading slurry refill material to affected areas and then sanding until surfaces are flat extends service life of platen up to 50 production cycles between downtime

B76-10277
FLEXIBLE FITTING FOR FLUID LINES
S L Barajas (Rockwell Intern Corp)
Aug 1976
MSC-17780 **Vol 1, No 2, p 287**
Tube fitting, consisting of movable tubular section containing two spring pressure Teflon actuated low friction seals two standard connectors and two hexagonal retaining nuts, provides flexible joint that allows axial and rotational motion

B76-10278
BOROSILICATE GLASS-TO-KOVAR TUBE BONDING
R F Harris
Aug 1976
GSFC-12077 **Vol 1, No 2, p 288**
Two-micron-diameter inlet leak, useful in mass spectrometry applications minimizes gas sample distortion that occurs between sample and leak is easily joined to spectrometer inlet system and withstands unusual gas pressures and temperatures

B76-10279
TECHNIQUE FOR JOINING METAL TUBING
H W Wright (TRW Inc)
Aug 1976
ARC-10946 **Vol 1, No 2, p 289**
Uniform wall thickness and uninterrupted heat transfer are achieved by using shaped metal insert as wall material for joint Insert acts as support during brazing after which excess material is ground away to bring joint to original tubing size

B76-10280
BRAZE/REBRAZE PROCESS FOR CRES STEEL
C E Silverman (Rockwell Intern Corp)
Aug 1976
MSC-19600 **Vol 1, No 2, p 289**
Using induction brazing process with 8 5-Au/16 5-Cu/2 0-Ni braze alloy joints in 21-6-9 CRES steel tubing can be reworked up to seven times thus significantly reducing cost of fabrication repair and part replacement

B76-10281
AGE-FORMING ALUMINUM PANELS
G I Baxter (General Dynamics Corp)
Aug 1976
MSC-12648 **Vol 1, No 2, p 290**
Contoured-stiffened 63 by 337 inch 2124 aluminum alloy panels are machined in-the-flat to make integral tapered T-capped stringers, parallel with longitudinal centerline Aging fixture, which includes net contour formers made from lofted contour templates has eggcrate-like structure for use in forming and checking panels

B76-10282
FRACTURE MECHANICS FOR WELD ACCEPTANCE
C A Bolstad (Martin Marietta Corp) and L W Loechel (Martin Marietta Corp)
Aug 1976
M-FS-23360 **Vol 1, No 2, p. 291**
Criteria include specifications for allowable cracklike defect lengths undercut, underfill suckback mismatch, peaking in butt welds, root penetration weld beam dimensions lap joint dimensions and acceptable defect sizes and densities for double and single fillet welds

B76-10283
MACHINING TITANIUM ALLOYS
I A Sutherland
Aug 1976
M-FS-23006 **Vol 1, No 2, p 291**
Study suggests ways of reducing chatte, increasing productivity, and reducing tool wear Report also describes static and dynamic cutting tests and tool materials and finishes

B76-10284
ANNEALING STRAINED ALLOY 718
T J Morrison (Rockwell Intern Corp)
Aug 1976
M-FS-19242 **Vol 1, No 2, p 292**
Report shows that grain coarsening in Alloy 718 can result in greatly reduced resistance to weld-heat-produced zone fissuring, especially when final grain size is ASTM 2 Tensile tests and metallographic examination of bend test specimens provide necessary data

B76-10421
MODULAR MULTIPURPOSE PANEL SUPPORT
M R Daun (Rockwell Intern Corp) and L A Maring (Rockwell Intern Corp)
Jan 1977
MSC-19641 **Vol 1, No 3, p 453**
Inexpensive set of modular semirigid box structures serve as multipurpose support for thin panels Fixture holds several different interchangeable two-part adjustable contour-board subassemblies Combining modules allows for accommodation to any length skin or panel

B76-10422
CONTAINERLESS PROCESSING OF TUNGSTEN
N Beser (GE) R T Frost (GE) E C OKress (GE), D J Rutecki (GE) and G Wouch (GE)
Jan 1977
M-FS-23509 **Vol 1, No 3, p 454**
Simultaneous electromagnetic levitation and electron-beam heating allow contaminationless melting of tungsten Possible application for this technique is production of X-ray targets

B76-10423
ACOUSTIC-ENERGY SHAPING OF MELTABLE METALS
D D Elleman and T G Wang
Jan 1977
NPO-13802 **Vol 1, No 3, p 455**
Containerless shaping technique is applicable to machining metals technology Process improves quality of melted metals by reducing introduction of impurities from container walls or floor

B76-10424
ALL-TANTALUM ELECTROLYTIC CAPACITOR
G E Green Jr (Aerotron Inc)
Jan 1977
M-FS-23462 **Vol 1, No 3, p 456**
Device uses single-compression tantalum-to-tantalum seal Single-compression seal allows better utilization of volume within device As result of all-tantalum case and lengthened cathode electrical parameters, particularly equivalent series resistance and capacitance stability improved over silver-cased capacitor

B76-10425
LOW-PRESSURE LOW-TEMPERATURE MOLDING PROCESS
E L Bowman (Rockwell Intern Corp)
Jan 1977
MSC-19778 **Vol 1, No 3, p 457**
Use of expanding rubber mandrel allows for bonding of graphite/epoxy laminated parts in oven instead of expensive autoclave Heavy-duty two-piece aluminum mold limits deflection Manipulation of resin contact by precise control of mandrel-generated pressure eliminates complex bleeder system

B76-10426
FUEL-CELL POWERPLANT INSULATION

R J Guthrie (United Technologies Corp)
Jan 1977
MSC-16012 **Vol 1, No 3, p 458**

Multilayer lightweight, flexible, thermal blanket is optimized for minimum weight and heat loss

B76-10427
REDUCED COSTS FOR SOLAR-CELL MODULES
A F Forestieri and E Anagnostou
Jan 1977
LEWIS-12185 **Vol 1, No 3, p 459**

Production expenses are decreased by embossing encapsulating plastic film to position and secure cells Electric circuit is printed on plastic film simultaneously with cell encapsulation process Procedure can be used with standard-contact and wraparound contact cells

B76-10428
IMPROVED BONDING OF HONEYCOMB PANELS
S A Sobkiewicz (Rockwell Intern Corp)
Jan 1977
MSC-19560 **Vol 1, No 3, p 459**

Technique using angular metal braces bonded onto panels lowers construction costs Technique improves overall structural strength decreases assembly time, and avoids wear points created by bolts and rivets

B76-10429
FABRICATION AND APPLICATIONS OF ELECTRETS
P K C Pillai and E L Shriver
Jan 1977
M-FS-23437 **Vol 1, No 3, p 460**

Permanently charged dielectrics can be made less expensively faster and more effectively using improved techniques and materials Methods include charge injection Tesla-coil charging and molten spray Possible uses include pollution control low-power sensors and illumination control

B76-10430
CLEANING LARGE TANKS AND GAS BOTTLES
I D Smith (White Sands Test Facility)
Jan 1977
MSC-14966 **Vol 1, No 3, p 461**

Distillation technique using vapor solvent trichloromonofluoromethane is economical effective and eliminates need to enter tank thus reducing risk of further contamination Solvent can be purified for reuse

B76-10431
GRAPHICAL METHODS FOR VARIABLE SAMPLING PLANS
K Teramura (Rockwell Intern Corp)
Jan 1977
MSC-19279 **Vol 1, No 3, p 462**

Simplified technique can be done quickly and without machine assistance Method provides more accurate quality-level information for given sample sizes

B76-10432
CONTROLLED LINEAR CLAMPER/LOADER
R M Steudl
Jan 1977
GSFC-12105 **Vol 1, No 3, p 463**

Pneumatic fixture can be used to clamp odd-shaped parts to non-uniform surface Device can be made from nonmagnetic materials for use in magnetic field test environments It also applies uniform load over clamped surface

B76-10433
HOT-WIRE TILE REMOVAL TOOL
J W Holt (Rockwell Intern Corp)
Jan 1977
KSC-11043 **Vol 1, No 3, p 464**

Cheesecutterlike device uses electrically heated wire to slice through thermosetting embedment Technique does not damage tile or create unwanted debris in work area

B76-10579
FORMING HARD ALUMINUM IN COMPLEX SHAPES
I J Wilson (Rockwell Intern Corp)
Mar 1977
MSC-19693 **Vol 1, No 4, p 635**

Three step procedure consisting of annealing cold working and precipitation heat treatment converts soft temper aluminum to T8 aluminum

B76-10580 **Vol 1, No 4, p 636**
ELECTRIC HEATING FOR METAL SURFACE HARDENING
N L Lockman (Rockwell Intern Corp)
Mar 1977
M-FS-19268

Electrical element heats only desired area and permits precise control of temperature and cooling rate Process serves as alternative to flame hardening for treating localized areas

B76-10581
YIELD-PRESSURE DETERMINATION
M E Wakefield (Martin Marietta Corp)
Mar 1977
MSC-14655 **Vol 1, No 4, p 636**

Stress/strain relationship of complex-shape vessel is recorded under hydrostatic pressure Technique is used to test pressurized gas cylinders and tubular transition joints made of dissimilar metals and to determine burst or system-failure pressures

B76-10582
CRYSTAL ORIENTATION FOR SOLID-STATE PHOTO LITHOGRAPHY
D P Marinelli (RCA)
Mar 1977
LANGLEY-11940 **Vol 1, No 4, p 637**

Method determines desirable direction to apply photoresist mask when fabricating semiconductor lasers Method can be applied to finished wafer without affecting device yield

B76-10583
PARYLENE COATING FOR CIRCUIT COMPONENTS
M J Berkebile R J Holbrook (Hughes Aircraft Co) and F W Oberin (Hughes Aircraft Co)
Mar 1977
M-FS-23450 **Vol 1, No 4, p 638**

Inexpensive internal coating improves reliability of plastic-packaged parts Coating protects device from effects of humidity and heat and acts as barrier between device and harmful substances generated by plastic-packaging material

B76-10584
INEXPENSIVE TAGS FOR TUBES OR CABLES
A J Fakolt
Mar 1977
LEWIS-12676 **Vol 1, No 4, p 638**

Split brass paper fasteners are used to identify tubes and cables in environments in which standard adhesive-backed identification tags do not adhere

B76-10585
RIGID CABLE SUPPORT FOR BLIND INSTALLATIONS
J R Abbott (Rockwell Intern Corp)
Mar 1977
MSC-19473 **Vol 1, No 4, p 639**

Mechanical support structure originally designed for use with electrical cables can support hydraulic pneumatic and cryogenic lines where bends are required assemblies are inaccessible and conduits are impractical Support is also light in weight and offers means of damping vibration

B76-10586
ELASTROSTATIC-DISCHARGE DAMAGE TO SEMICONDUCTORS
E R Freeman Jr (Martin Marietta Corp) and J R Beall (Martin Marietta Corp)
Mar 1977
LANGLEY-11739 **Vol 1, No 4, p 640**
Failure mechanisms test techniques and quality control procedures for difficult-to-detect class of failures have been devised Test circuit provides electrostatic discharge similar to those encountered in production situation and assists in evaluation of susceptibility of specific circuits and devices

B76-10587
TRANSDUCER BONDING KIT
R M Roush, Jr (Rockwell Intern Corp) D A Lott (Rockwell Intern Corp) and A R Keir (Rockwell Intern Corp)
Mar 1977
MSC-19690 **Vol 1, No 4, p 641**
Inexpensive kit improves bond quality saves time and is used in hard-to-reach areas Kit provides precise pressure loading and allows pressure to be monitored during curing cycle

B76-10588
EXPLOSIVE-SEAM WELDING SEALS LARGE PRESSURE VESSELS
L J Bement
Mar 1977 See also B72-10002, B73-10180
LANGLEY-12132 **Vol 1, No 4, p 642**
Simple single-step operation hermetically seals aluminum brass steel copper, and titanium vessels

B76-10589
VACUUM HOLDDOWN FIXTURE
P P Zebus (Rockwell Intern Corp) and P N Packer (Rockwell Intern Corp)
Mar 1977
MSC-19666 **Vol 1, No 4, p 643**
Variable-contour jig supports concave or convex objects

B76-10590
VISUAL PROJECTION RETICLE
R F Haines
Mar 1977
ARC-10976 **Vol 1, No 4, p 644**
Small lightweight device visually superimposes visual-sensitivity and response contours on displays and instrument panels Optical system provides 45 deg arc/diameter field of view however special wide-angle optics can be substituted without significant size or weight penalty

B76-10591
ANTIREFLECTION COATING FOR PLASTIC LENSES
T J Wydeven and R M Kubacki (Bell and Howell Co)
Mar 1977
ARC-10983 **Vol 1, No 4, p 645**
Low-temperature plasma polymerized coating improves light transmission through plastic lenses

B76-10592
MIXING INGREDIENTS IN FOAM DISPENSER
W G Simpson
Mar 1977
M-FS-20607 **Vol 1, No 4, p 646**
Mixing insert built into nozzle blends fluids so that nozzle sprays homogeneous mixture Simple construction of dispenser makes cleanup easy

B76-10593
ALUMINUM TRANSFER METHOD FOR PLATING PLASTICS
W D Goodrich and C J Stalmach Jr (LTV Aerospace Corp)
Mar 1977 See also B76-10556, NASA-CR-144364 (75-29356)
MSC-16221 **Vol 1, No 4, p 646**
Electroless plating technique produces plate of uniform thickness Hardness and abrasion resistance can be increased further by heat treatment Method results in seamless coating over many materials has low thermal conductivity, and is relatively inexpensive compared to conventional methods

B76-10594
ELIMINATION OF THERMALLY GENERATED EMF'S ON PC BOARDS
R G Holden (Singer Co) and M T Smid (Singer Co)
Mar 1977
MSC-16125 **Vol 1, No 4, p 647**
Dissimilar-metal contacts are placed on temperature-*controlled substrate*

B76-10595
PREFABRICATED STRAIN-GAGE CONNECTORS
A W Baker (Rockwell Intern Corp)
Mar 1977
MSC-19522 **Vol 1, No 4, p 648**
Terminals incorporating copper loops reduce on-site installation time for instrumentation

B76-10596
FABRICATION OF ULTRA-LOW-NOISE AMPLIFIER
E Kraemer (Cutler-Hammer Inc) and J Leeper (Cutler-Hammer, Inc)
Mar 1977
GSFC-12186 **Vol 1, No 4, p 648**
Three construction techniques reduce noise temperature of microwave parametric amplifier Techniques include electroformed idler cavity screw-tuned idler, and low-loss matching section

09 MATHEMATICS AND INFORMATION SCIENCES

B76-10133
ESTIMATION OF SPARES
M A Mezzacappa (Rockwell Intern Corp)
Mar 1976
MSC-19469 **Vol 1, No 1, p 135**
Simplified technique to determine the number of spare parts required for a given risk level employs short-cut approximations in lieu of computer-assisted or complex computational analyses

B76-10134
LINEAR STOCHASTIC OPTIMAL CONTROL AND ESTIMATION
L C Geyser and F K B Lehtinen
Mar 1976
LEWIS-12505 **Vol 1, No 1, p 135**
Digital program has been written to solve the LSOCE problem by using a time-domain formulation LSOCE problem is defined as that of designing controls for linear time-invariant system which is disturbed by white noise in such a way as to minimize quadratic performance index

B76-10135
GUIDE FOR TESTING NUMERICAL-INTEGRATION SUBROUTINES
F T Krogh
Mar 1976
NPO-11644 **Vol 1, No 1, p 136**
Numerical technique has been developed for testing algorithms used to solve differential equations

B76-10136
BUSINESS CAPABILITIES FILE
W H Anderson and D A Costanza (Informatics, Inc)
Mar 1976
NPO-13834 **Vol 1, No 1, p 136**
Automated search system identifies businesses by their functional capabilities and geographic location File is easy to maintain and update

B76-10285
RELATIVE HUMIDITY FROM PSYCHROMETRIC DATA
T W Putnam
Aug 1976
FRC-10108 **Vol 1, No 2, p 295**

Analytical equation for computing relative humidity as function of wet bulb temperature, dry bulb temperature and atmospheric pressure is suitable for use with calculator or computer Analytical expressions may be useful for chemical process control systems and building environmental control systems

B76-10286
BIT-ERROR RATES IN OPTICAL COMMUNICATIONS
W E Webb (Alabama Univ)
Aug 1976
M-FS-23340 **Vol 1, No 2, p 296**

Statistical model, which consists of on/off binary system assumes Poisson detection process and log-normal atmospheric scintillation Based upon detection process and atmospheric ionization, piecewise linear model for adaptive threshold system is developed

B76-10287
LEARNING/COST-IMPROVEMENT CURVES
L M Delionback
Aug 1976
M-FS-23429 **Vol 1, No 2, p 296**

Review guide is an aid to manager or engineer who must determine production costs for components, systems or services Methods are described by which manufacturers may use historical data task characteristics and current cost data to estimate unit prices as function of number of units to be produced

B76-10288
MULTIVARIATE NORMAL INTEGRATION
L W Falls and M C Carter (Appalachian State Univ)
Aug 1976
M-FS-22867 **Vol 1, No 2, p 297**

Monte Carlo program evaluates integrals over rectangular regions for dimensions less than six and over elliptical regions in bivariate case Program gives positive definite symmetric variance/covariance matrix factorization and calculates reciprocal of lower triangular matrix and product of diagonal elements of triangular matrix

B76-10289
DORCA II DYNAMIC OPERATIONS REQUIREMENTS AND COST ANALYSIS PROGRAM
Innovator not given (Aerospace Corp) Aug 1976
HQN-10834 **Vol 1, No 2, p 297**

Program is written to handle logistics of acquisition and transport of personnel, equipment and services and to determine costs, transport schedules, acquisition schedules, and fuel requirements of cargo transport

B76-10434
CURVILINEAR BICUBIC-SPLINE-FIT INTERPOLATION
C H Chi (Perkin-Elmer Corp)
Jan 1977
LANGLEY-11391 **Vol 1, No 3, p 467**

Modified technique is suited to circular systems represented by polar grid patterns

B76-10435
INTERLEAVED CYCLIC CODES
R W Hockenberger (IBM)
Jan 1977
KSC-11040 **Vol 1, No. 3, p 468**

Analytical approach for development burst error correction and detection cyclic codes does not require shortening techniques

B76-10436
CONTOURING RANDOMLY SPACED DATA
J F Kibler, W D Morris, and R W Hamm (Computer Sci Corp)
Jan 1977
LANGLEY-12044 **Vol 1, No 3, p 469**

Computer program using triangulation contouring technique contours data points too numerous to fit into rectangular grid Using random access procedures, program can handle up to 56,000 data points and provides up to 20 contour intervals for multiple number of parameters

B76-10437
META-ASSEMBLER
B C Hodges (McDonnell-Douglas Corp) and A J Edwards
Jan 1977
M-FS-23449 **Vol 1, No 3, p 469**

Machine-independent cross-assembler program can produce object modules for variety of computers Program is capable of being reconfigured by data set supplied at assembly time

B76-10438
PROCESSING EQUATIONS FOR STATE-SPACE MODELS
R C Seidel
Jan 1977
LEWIS-12555 **Vol 1, No 3, p 469**

Three computer programs comprising six subroutines are used to calculate matrix stability and frequency response

B76-10597
DOCUMENT RESTORATION BY COMPUTER TECHNIQUES
L Mogavero W Spuck (Caltech), and I M Levitt (Office of the Mayor Philadelphia Pa)
Mar 1977
HQN-10910 **Vol 1, No 4, p 651**

Technique utilizes automated electronic data-processing machine to successfully recover illegible information from faded or age distorted documents Once recovered information can be displayed on cathode-ray-tube screen or reproduced in any desired size

B76-10598
SAFETY ORGANIZATIONS AND EXPERTS
G Mandel, R I Rubinstein (Franklin Inst) J J Pinto (Franklin Inst), and S Z Meschkow (Franklin Inst)
Mar 1977 See also B74-10019, NASA-CR-121206 (N74-10887), NASA-CR-134929 (N76-25153)
LEWIS-12742 **Vol 1, No 4, p 652**

Handbook lists organizations and experts in specific, well defined areas of safety technology Special emphasis is given to relevant safety information sources on aircraft fire hazards and aircraft interior flammability

B76-10599
LIBRARY INFORMATION RETRIEVAL SYSTEM
I Y Chan
Mar 1977
NPO-14017 **Vol 1, No 4, p 653**

Program provides information retrieval by one or more of following data elements subject, title authors/editors, source, contract number and report number

B76-10600
CAMSP CLASSIFICATION AND MENSURATION SOFTWARE PACKAGE
Innovator not given (IBM Federal Systems Div) Mar 1977
MSC-14979 **Vol 1, No 4, p 653**

Batch/interactive system can be used to analyze any remotely sensed Earth resources data Configuration requirements are 300K bytes of main storage 200K bytes of storage for IMS, 600K bytes of storage for LCS five 2314 disk drives seven 9-track tape drives, and one cluster of digital television equipment

B76-10601
OBLIQUE ORTHOGRAPHIC PROJECTIONS AND CONTOUR PLOTS
G L Giles
Mar 1977
LANGLEY-11877 **Vol 1, No 4, p 654**

Oblique orthographic projections allow model to be viewed in any selected orientation specified by Euler-angle transformation This transformation resolves coordinate system of model to principal plane on which display is to be plotted

B76-10602
DATA-MANAGEMENT AND INFORMATION SYSTEM
J J Long J N Hatfield M R Diethelm, and G Masters
Mar 1977
NPO-13716 **Vol 1, No 4, p 654**
User command language consists of unabbreviated English words System allows user to create, delete, sort, merge update, punch or transfer all or portion of any file in system without programmer assistance

B76-10603
CODE-USAGE ANALYSIS SYSTEM
M A Goodwin (Lockheed Electronics Co) and P H Horsley (Lockheed Electronics Co)
Mar 1977
MSC-16214 **Vol 1, No 4, p 655**
Set of computer programs helps in interpretation of execution characteristics of application programs and applies software technology to questions concerning software performance and quality

B76-10604
FORTRAN CODE-EVALUATION SYSTEM
J D Capps and R Kleir
Mar 1977
M-FS-23539 **Vol 1, No 4, p 655**
Automated code evaluation system can be used to detect coding errors and unsound coding practices in any ANSI FORTRAN IV source code before they can cause execution-time malfunctions System concentrates on acceptable FORTRAN code features which are likely to produce undesirable results

B76-10605
TRANSFER-FUNCTION PARAMETERS
R C Seidel
Mar 1977
LEWIS-12612 **Vol 1, No 4, p 656**
Computer program fits linear-factored form transfer function to given frequency-response data Program is based on conjugate-gradient search procedure that minimizes error between given frequency-response data and frequency response of transfer function that is supplied by user

B76-10606
INFORMATION RETRIEVAL AND DISPLAY SYSTEM
J L Groover (Computer Sci Corp) and W L King (Computer Sci Corp)
Mar 1977
M-FS-23510 **Vol 1, No 4, p 657**
Versatile command-driven data management system offers users through simplified command language a means of storing and searching data files, sorting data files into specified orders performing simple or complex computations effecting file updates, and printing or displaying output data Commands are simple to use and flexible enough to meet most data management requirements

B76-10607
LINEAR STOCHASTIC OPTIMAL CONTROL AND ESTIMATION
L C Geyser and F K B Lehtinen
Mar 1977
LEWIS-12540, LEWIS-12505 **Vol 1, No 4, p 657**
Problem is defined as that of designing controls for linear time invariant system which is disturbed by white noise, in such a way as to minimize quadratic performance index

B76-10608
INTEGRAL-MATRIX PROCEDURE FOR BOUNDARY-LAYER PROBLEMS
K W Gross and R M Evans (Acurex Corp)
Mar 1977
M-FS-23348 **Vol 1, No 4, p 657**
Program BLIMP provides fast, highly accurate solution to general class of gas-phase boundary layer flow problems encompassing broad range of boundary conditions Program is capable of obtaining accurate and economical solutions to governing differential equations of momentum energy and species

B76-10609
SYSTEMS IMPROVED NUMERICAL DIFFERENCING ANALYZER
L C Fink (TRW Inc)
Mar 1977 See also B72-10721 B72-10736
MSC-13805 **Vol 1, No 4, p 658**
Analyzer is software system that possesses capabilities which make it well suited for solving lumped-parameter representations of physical problems governed by diffusion-type equations, such as Fourier, Poisson, or La Place

B76-10610
INPUT/OUTPUT ERROR ANALYZER
E T Vaughan
Mar 1977
GSFC-12132 **Vol 1, No 4, p 659**
Program aids in equipment assessment Independent assembly-language utility program is designed to operate under level 27 or 31 of EXEC 8 Operating System It scans user-selected portions of system log file, whether located on tape or mass storage, and searches for and processes 1/0 error (type 6) entries

SUBJECT INDEX

Subject Index

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